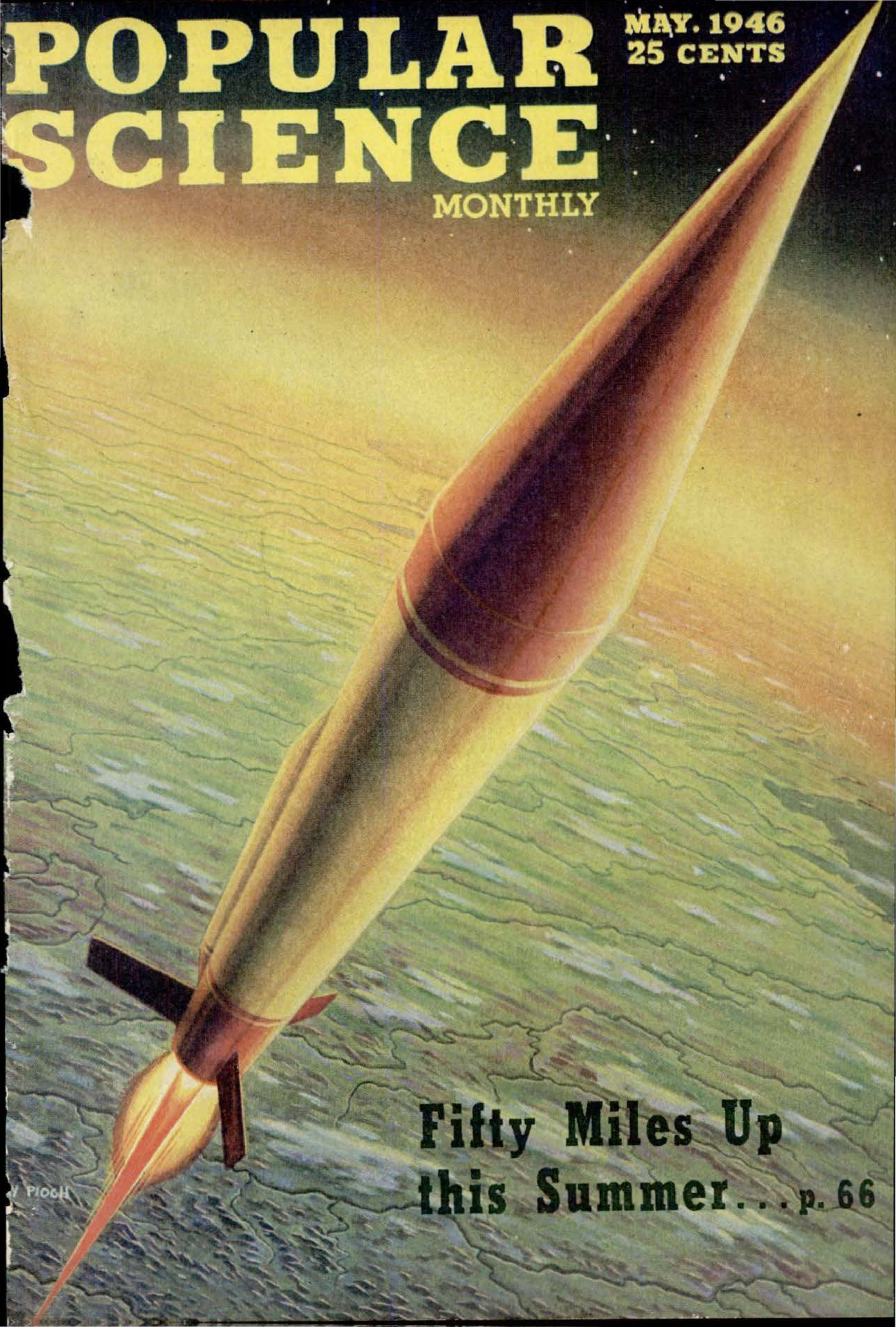
# POPULAR SCIENCE MONTHLY

MAY. 1946
25 CENTS



SENSATIONAL BARGAINS WHILE OUR HUGE STOCK LASTS

# SALE of WASHERS·COTTERS for MECHANICS,

**Every Experimenter, Home Craftsman Needs These Assortments!**

# LOOK at these BIG, MONEY-SAVING

## WOOD SCREWS

Different types of heads in a large variety of diameters and lengths are included in this Big 5-lb. assortment of Wood Screws. You'll find many you may need right now! Shipping weight 6 pounds. **No. 301**—a wonderful value for only..... **99c**

## HEAVY DUTY FASTENERS

These Heavy Duty Cap Screws, Machine and Carriage Bolts, Nuts, Lag Screws, Rivets, 3/16" diameter and up. Assorted lengths: very useful for contractors, maintenance, camps, builders, etc. Shipping weight 12 pounds. **No. 108**—10 lbs. for.... **$2.49**

## SPECIAL TREASURE CHEST $7.98
## 100-LB. ASSORTMENT
### *Think of it—Less than 8c a lb.*

This popular assortment contains a large variety of useful Screws, Nuts, Bolts, Rivets, Washers, etc. mostly 1/4" and larger diameters suitable for farm, garage, or shop use, or wherever a large assortment is needed. Full 100-lb. valuable Treasure Chest (It has many uses after its original contents have been utilized) of clean, new fasteners in this Giant Assortment. Shipping weight 115 lbs. **No. 107**—Price only ..... **$7.98**

SAVE A DOLLAR—Order two Treasure Chests for only **$14.96!**

## WASHERS! WASHERS! WASHERS!

**LOCKWASHERS**—Kantlink and Shakeproof type Split and Tooth Lockwashers in popular sizes. A very handy assortment. Shipping weight 2 lbs. **No. 201**—1000 pieces, **$1.49**

**FLAT WASHERS**—Steel, Brass, Copper and Aluminum Flat Washers to fit any size from 1/8" to 1/2". Ship. wt. 2 lbs. **No. 202**—1000 of these useful washers for only..... **$1.00**

**INSULATING WASHERS**—A valuable assortment which includes washers of Fibre, Bakelite, Mica and other insulating material. Ship. wt. 1 lb. **No. 204**—1000 pieces, **$1.00**

**BIG GIANT WASHER BARGAIN!** All 3 of the above assortments — 3000 Washers for **$3.25! No. 211**—Shipping weight 5 lbs.

## SOCKET SCREWS

Set and Cap Screws, from 6-32 to 1/2" diameter. Ship. wt. 1 lb. **No. 206**—100 pieces for..... **$2.39**

## SET SCREWS

Headless, Hexagon and Square Head Set Screws in popular sizes and lengths. Shipping weight 2 lbs. **No. 213**—200 pieces..... **$1.25**

## CAP SCREWS

An assortment of the most popular USS and SAE sizes from 1/4" up, in various lengths. This assortment is a "must" for garages, auto repair shops, hobbyists and all who use cap screws. Ship. wt. 12 lbs. **No 205**—300 pieces for... **$1.95**

## NEW! PHILLIPS RECESSED HEAD TYPE SCREWS! 500 for $1.48

Newest type screws for replacement, repairs on autos, radios, appliances, etc. Machine, Wood and Sheet Metal Screws in popular sizes, head styles and lengths. FREE—Special screw driver with each assortment. Ship. wt. 3 lbs. **No. 203**—500 pieces..... **$1.48**

## LUGS-CLIPS-CONNECTORS

Handy assortment suitable for radio set builders, repairment, experimenters, almost everyone. Many shapes and types, suitable for a great variety of uses. Shipping weight 1 lb. **No. 303**—a real buy — 500 pieces for.. **96c**

DOUBLE VALUE! 1000 pieces..... **$1.79**

## RIVETS

**SMALL RIVETS**—Solid, Split, Tubular Rivets of Steel, Brass, Copper and Aluminum. Ship. wt. 2 lbs. **No. 207**—1000 pieces **$1.39**

**HEAVY DUTY RIVETS**—Solid Steel and Brass Rivets in standard heads, diameters and lengths. Ship. wt. 17 lbs. **No. 307**—15 lbs. for ..... **$1.49**

## RADIO ASSORTMENT

**Attention, Radio Service Men, Electricians, Experimenters, Repair Men, Hobbyists!**

Big insulation and wire assortment includes spaghetti, tubing, lead wire, mica, bakelite, fibre and mica pieces, couplings, connectors, sockets, fuses, etc. Ship. wt. 6 lbs. **No. 400**—1000 useful pieces for..... **$1.29**

# HUDSON TRADING CORP.

YOU ARE BOUND TO FIND WHAT YOU WANT IN A HUDSON ASSORTMENT

Copyrighted material

GET THESE HARD-TO-FIND PARTS • BUY ASSORTMENTS AND SAVE!

# SCREWS·NUTS·BOLTS·RIVETS

## STUDS·SPRINGS·RODS·EYELETS·PINS·SPECIALS

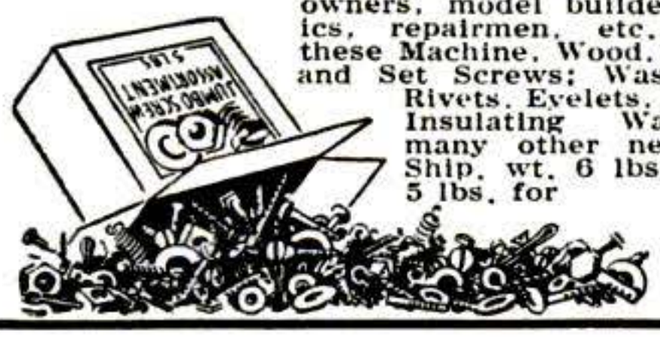
## HOBBYISTS, FARMERS, GARAGES

**Ideal for Model Builders, Fix-It Shops, Appliance Repairs, Toys, Radios, Bikes!**

**Valuable For Mines, Machine Shops, Oil Co's, Camps, Service Stations!**

# Assortments at almost GIVE-AWAY PRICES

### JUMBO ASSORTMENT OVER 1000 PIECES



Servicemen, experimenters, home-owners, model builders, mechanics, repairmen, etc. will want these Machine, Wood, Sheet Metal and Set Screws; Washers, Nuts, Rivets, Eyelets, Clips, Lugs, Insulating Washers and many other needed parts. Ship. wt. 6 lbs. **No. 700**—5 lbs. for **$1.98**

### FREE

**Special offer! 1000 assorted cotter pins, various sizes and lengths, rust-proofed, included free with every order amounting to $10.00 or more.**

## LOOK WHAT YOU CAN GET FOR ONE DOLLAR!

**SPRINGS**—200 Assorted small springs; expansion, contraction, and coil type. very handy. Shipping weight 1 lb. **No. 208**—Price . . . . . **$1.00**

**EYELETS**—An exceptional value! Assorted diameters and lengths. Brass, some plated. Shipping weight 1 lb. **No. 311**—1000 pieces only . . . . . **$1.00**

**STOVE BOLTS**—Nuts included in this useful assortment. Diameters from 1/8" to 3/8". Different head styles, lengths. Ship. wt. 2 lbs. **No. 315**—250 pieces . . **$1.00**

**SHEET METAL** (Self-Tapping) **SCREWS**—For metal workers, tin shops, garages, etc. Assorted sizes, lengths. Ship. wt. 2 lbs. **No. 109**—500 for . . . . . **$1.00**

**SPECTACULAR SALE!** All four of the above $1.00 assortments for only $3.69! **No. 111**—Shipping wt. 6 lbs.

### CAN YOU USE THESE REGULAR ITEMS AT BARGAIN PRICES?

**Immediate Delivery From Stock!**

No. 3 x 1/2" Flat Head Steel Wood Screws
No. 10 x 1-3/4" Flat Head Steel Wood Screws
1/2-13 x 4-1/4" Hex Hd. Steel Machine Bolts
No. 4 x 1 Steel Taper Pins
7/16" O.D. x 3/16" I.D. x 1/32" Thick Brass Washers
3/8-24 x 7 Hex Hd. Steel Cap Screws
**STEEL COTTER PINS**- 1/16", 3/32", 1/8", 5/32", 3/16", 1/4" diameters, all lengths
**STEEL SPLIT LOCKWASHERS**—No. 4, 6, 8, 10, 12, 1/4", etc.
**STEEL TOOTH LOCKWASHERS**—(Internal and External) No. 6, 8, 10, 12, 1/4" etc.

ALSO IN STOCK Large Quantities of Brass Cap Screws and Semi-Finished Nuts; in addition to the millions of standard Screws, Nuts, Bolts, Washers, Rivets and Other Fastening Items.

All merchandise offered subject to prior sale advise quantity for price. Send us your specific inquiries, or write for Stock List.

## MA-1519 N. WELLS ST. CHICAGO 10, ILL.

**MAIL THIS COUPON NOW**

## ORDER CAREFULLY BY NUMBER

**Hudson Trading Corp.**
**MA-1519 N. Wells St.**
**Chicago 10, Ill.**

Gentlemen: Enclosed please find $. . . . . plus $. . . . . shipping charges on the assortments listed below. I understand that if I am not satisfied, my money will be cheerfully refunded.

Name . . . . . .

Address . . . . . .

City . . . . . Zone . . . . . State . . . . . .

☐ Check here if your order amounts to $10.00 or more to get FREE 1000-piece Cotter Pin Assortment as described above.

☐ Check here if you have any specific requests for Screws, Nuts, Bolts, Washers, Rivets, etc. Give us full description, sizes, quantities desired. Write your needs on a separate sheet of paper.

☐ Check here to put your name on our FREE BARGAIN MAILING LIST.

List your orders for Assortments below. Use the space at the bottom of the page or additional sheets of paper, if necessary.

| Quantity | Assortment No. | Price |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |



Copyrighted material

FOUNDED 1872 VOL. 148: No. 5

# POPULAR SCIENCE

Mechanics & Handicraft MONTHLY

REG. U. S. PAT. OFF.

EDITOR:
Perry Githens

MANAGING EDITORS: Fred O. Newman, Volta Torrey

ART EDITOR: Robert Reid Macguire

HOME & WORKSHOP EDITOR:
Harry Walton

ASSOCIATE EDITORS: Edward F. Allen, Alden P. Armagnac, Bernard P. Blankman, Devon Francis, James L. Freeman, Wesley S. Griswold, Robert Gorman, Hartley E. Howe, Frank Rowsome, Jr., Gold V. Sanders, Leon Shloss, R. P. Stevenson

ART DIRECTORS: Michele de Santis, Harry Samuels, F. Sweeney

ART ASSOCIATES: Samuel Dukler, Stewart Rouse, Frances Cooper (Production)

STAFF PHOTOGRAPHERS: W. W. Morris, Hubert Luckett

EDITORIAL ASSISTANTS: Elsie E. Brandt, Michael Cerniello, Carol Ennis, David McNamara, Lillian Thalenfeld, Saverio Rada, Ruth Westphal

PUBLISHER:
Godfrey Hammond

MAY 1946

Cover Painting by RAY PIOCH

## SCIENCE NEWS

50 Miles Up This Summer..... 66
Baby V-1 Flies for Fun..... 82
Atomic Medicine Can Lengthen Your Life.. 91
Gravest Illnesses Are Tasks for Atomic Research..... 96
60-Pound "Plastic Lung".....104

## SCIENCE AT WORK

Boards Bigger Than Trees..... 65
X rays Analyze Chemicals..... 72
Mechanical Tree Planter..... 98
Mud That's Worth Money.....105
Plastics Go Big.....122
Printing Radio Sets on Calling Cards.....131
Echoless Room Lined with 20,000 Wedges..134
Electronic Cardiograph .....134

## PSM FEATURES

Living in Circles..... 74
Really Doubling in Brass..... 81
Rail Workers Turn Scrap into Tools..... 90
Westinghouse Centenary.....100
Mounting a Bird of Paradise.....104
Tank "Battleships".....135
Missiles That Find the Light.....135
Experiments with Supermagnets.....194
Wood Through a Microscope.....197
Cellulose: Plant-Life Mystery.....199

## AVIATION

100-Ton Flying Wing..... 78
Heli-taxis Are Here..... 84
XB-36, Superbomber..... 97
What's New In Aviation.....128

## AUTOMOBILES

How Your Car Turns Corners..... 76
Do You Know Your 1946 Cars?.....112
Auto Hints.....138
Safety Valves For Your Car.....139
Gus, Stan, and a Schoolmarm.....142
Tractor Built from Auto Parts.....208

## INVENTIONS

New Ideas from the Inventors.....102
I'd Like to See Them Make.....111

## PHOTOGRAPHY

Microscope Movies of Hair..... 89
Wax Dolls Are New Film Stars.....108
Flashes of Smashes.....114
Props Put Atmosphere Into Photos.....182
New Photo Equipment.....185
Curious Photos .....186
Photo Ideas .....187

## MECHANICS & SHOPCRAFT

Blade for Midget Spokeshave.....156
A Sturdy Bandsaw Base.....159
Nonmarring Hammer.....173

(CONTINUED ON PAGE 4)

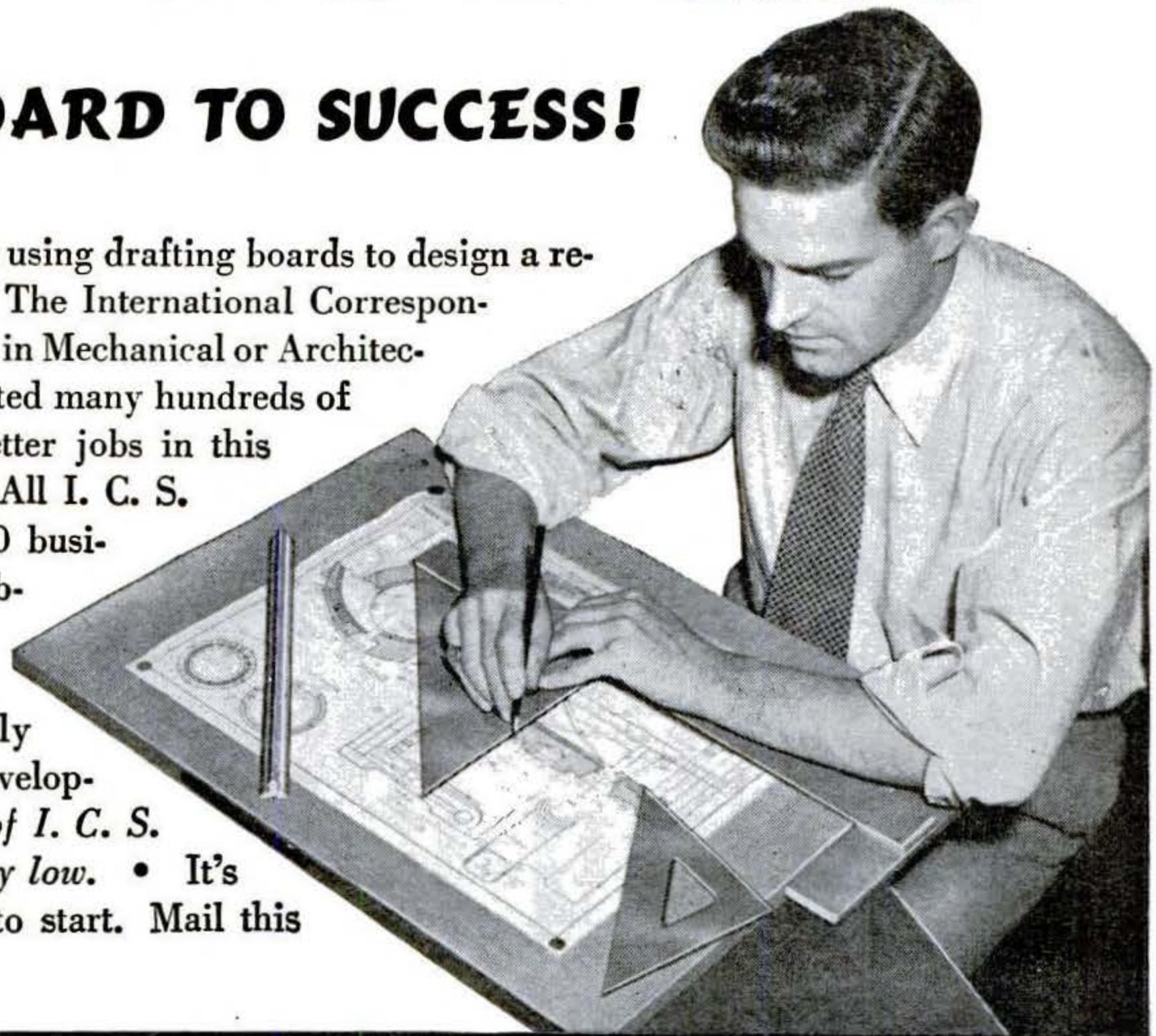
Published monthly at 353 Fourth Avenue, New York 10, N. Y. by Popular Science Publishing Co., Inc. Godfrey Hammond, President and Treasurer; R. C. Wilson, Raymond J Brown, Stephen P Glennon, B. Ray Keefer, Vice Presidents; F. W. Briggs, Secretary Entered as second-class matter Dec. 28, 1918, at the Post Office at New York under the act of March 3, 1879; additional entry as second-class matter at Dayton, Ohio. Entered as second-class matter at the Post Office Department, Canada. Printed in U.S.A. Copyright, 1946, by Popular Science Publishing Co., Inc. All rights reserved in the United States, Great Britain, and in all countries participating in the International Copyright Convention and Pan-American Copyright Convention. Yearly subscriptions to United States and its possessions, $2.50; Canada, $3.00; foreign countries, excepting Canada, $3.50. Subscribers must notify us of change of address four weeks in advance of the next publication date. Be sure to give both old and new addresses.



Copyrighted material

# DRAFTING

## SPRINGBOARD TO SUCCESS!



MANY men today are using drafting boards to design a rewarding future. • The International Correspondence Schools Courses in Mechanical or Architectural Drafting have fitted many hundreds of ambitious men for better jobs in this well-paid field. • All I. C. S. Courses (covering 400 business and technical subjects) are prepared by leading *practical* authorities, constantly revised to meet new developments. *Yet the cost of I. C. S. training is surprisingly low.* • It's not too late for *you* to start. Mail this coupon *today!*

**INTERNATIONAL CORRESPONDENCE SCHOOLS** ICS

**BOX 7657-L, SCRANTON 9, PENNA.**

Without cost or obligation, please send me full particulars about the course *before* which I have marked X:

**Air Conditioning and Plumbing Courses**
- ☐ Air Conditioning
- ☐ Heating ☐ Plumbing
- ☐ Refrigeration ☐ Steam Fitting

**Chemistry Courses**
- ☐ Chemical Engineering
- ☐ Chemistry, Analytical
- ☐ Chemistry, Industrial
- ☐ Chemistry, Mfg. Iron & Steel
- ☐ Petroleum Refining ☐ Plastics
- ☐ Pulp and Paper Making

**Civil Engineering, Architectural and Mining Courses**
- ☐ Architectural Drafting
- ☐ Architecture
- ☐ Bridge and Building Foreman
- ☐ Building Estimating
- ☐ Civil Engineering
- ☐ Coal Mining
- ☐ Contracting and Building
- ☐ Highway Engineering
- ☐ Lumber Dealer
- ☐ Reading Structural Blueprints
- ☐ Sanitary Engineering
- ☐ Structural Drafting
- ☐ Structural Engineering
- ☐ Surveying and Mapping

**Communications Courses**
- ☐ Electronics
- ☐ Practical Telephony
- ☐ Radio, General
- ☐ Radio Operating
- ☐ Radio Servicing
- ☐ Telegraph Engineering

**Electrical Courses**
- ☐ Electrical Drafting
- ☐ Electrical Engineering
- ☐ Electric Light and Power
- ☐ Lighting Technician
- ☐ Practical Electrician

**Internal Combustion Engines Courses**
- ☐ Auto Technician ☐ Aviation
- ☐ Diesel-Electric
- ☐ Diesel Engines ☐ Gas Engines

**Mechanical Courses**
- ☐ Aeronautical Engineering
- ☐ Aircraft Drafting
- ☐ Flight Engineer
- ☐ Foundry Work
- ☐ Heat Treatment of Metals
- ☐ Industrial Engineering
- ☐ Industrial Metallurgy
- ☐ Machine Shop
- ☐ Mechanical Drafting
- ☐ Mechanical Engineering
- ☐ Mold-Loft Work
- ☐ Patternmaking—Wood, Metal
- ☐ Reading Shop Blueprints
- ☐ Sheet-Metal Drafting
- ☐ Sheet-Metal Worker
- ☐ Ship Drafting ☐ Ship Fitting
- ☐ Tool Designing
- ☐ Toolmaking
- ☐ Welding—Gas and Electric

**Railroad Courses**
- ☐ Air Brake ☐ Car Inspector
- ☐ Diesel Locomotive
- ☐ Locomotive Engineer
- ☐ Locomotive Fireman
- ☐ Railroad Section Foreman

**Steam Engineering Courses**
- ☐ Boilermaking
- ☐ Combustion Engineering
- ☐ Engine Running
- ☐ Marine Engineering
- ☐ Steam Electric ☐ Steam Engines

**Textile Courses**
- ☐ Cotton Manufacturing
- ☐ Rayon Weaving
- ☐ Textile Designing
- ☐ Woolen Manufacturing

**Business and Academic Courses**
- ☐ Accounting ☐ Advertising
- ☐ Arithmetic ☐ Bookkeeping
- ☐ Business Correspondence
- ☐ Business Management
- ☐ Certified Public Accounting
- ☐ Commercial
- ☐ Cost Accounting
- ☐ Federal Tax
- ☐ First Year College
- ☐ Foremanship ☐ French
- ☐ Good English ☐ High School
- ☐ Higher Mathematics
- ☐ Illustrating ☐ Motor Traffic
- ☐ Postal Service
- ☐ Salesmanship ☐ Secretarial
- ☐ Sign Lettering
- ☐ Spanish ☐ Stenography
- ☐ Traffic Management

*Name*_____ *Age*____ *Home Address*_____

*City*_____ *State*_____ *Present Position*_____

*Working Hours*_____ *A.M. to*_____ *P.M.* **Check here if Veteran of World War II**_____

*Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.*
*British residents send coupon to I. C. S., 71 Kingsway, London, W. C. 2, England.*



Copyrighted material

OVER
2,000,000,000
MILES OF FLYING

behind YOUR NEW
PIPER CUB

The Piper Cub Special has fifteen years of light-plane experience built into it. Safe, easy-to-fly, economical to operate, it costs less than any other plane today . . . only $665 down. A free flying course goes with every new Piper Cub! See your Piper Cub Dealer for a free flight demonstration.

HERE ARE 3 FINE AVIATION BOOKS FOR *Your Library!*

Thousands of requests are pouring in for this latest Piper book on current models and for these new editions of two already famous books, off the press just a few weeks ago:

1. ***Piper Cub Brochure.*** Brand new! Beautiful full-color airplane illustrations, suitable for framing. Complete specifications of Piper Cubs.

2. ***"How to Fly" Book.*** Takes you on a typical flying lesson with 53 step-by-step photos and descriptions. Many other interesting facts.

3. ***"What Your Town Needs" Book.*** Will help you plan an inexpensive landing area now.

Get these books from your Piper Cub Dealer now. Or, if you prefer, send us 10c per book or 25c for all three. Use stamps or coins. Specify which books you desire. Write Dept. PS56.

PIPER AIRCRAFT CORPORATION
LOCK HAVEN, PENNA.

PIPER



The Saw that Cuts Corners....176
New Shop Ideas....180
Homemade Elevator....204
Railroad-Spike Planishing Stake....206
Cable Hoist Carries Coal....208


## HOME MECHANICS & HANDICRAFT


Decorations for a Hope Chest....116
An Extra Room Outside the House....146
Door-to-Knowledge Book Ends....150
Hobnail Lamps....151
Table for Portable Sewing Machine....152
Young Carpenter's Workbench....154
Finishing Radiators and Pipes....155
Wood Inlay on Jewelry Box....156
Carved Card Tray....158
Topsy-Turvy Turtle Sundial....162
Dive-Bomber Weather Vane....162
The Drill Press as a Planer....164
Homemade Bilge Pump....168
Inboard Engines for Small Boats....169
Carving a Cap-and-Ball Pistol....174
Plaster Keeps Tobacco Moist....193
Fluorescent-Lamp Markers....193
Sewing-Machine Lamp....196
Restoring Lawn Chairs....202
Tin-Can Ends Shaped into Bowls....205
Hammered Copper Ash Tray....206
What's Wrong?....207
Moisture-Sealing Plywood....207


## RADIO & ELECTRICITY

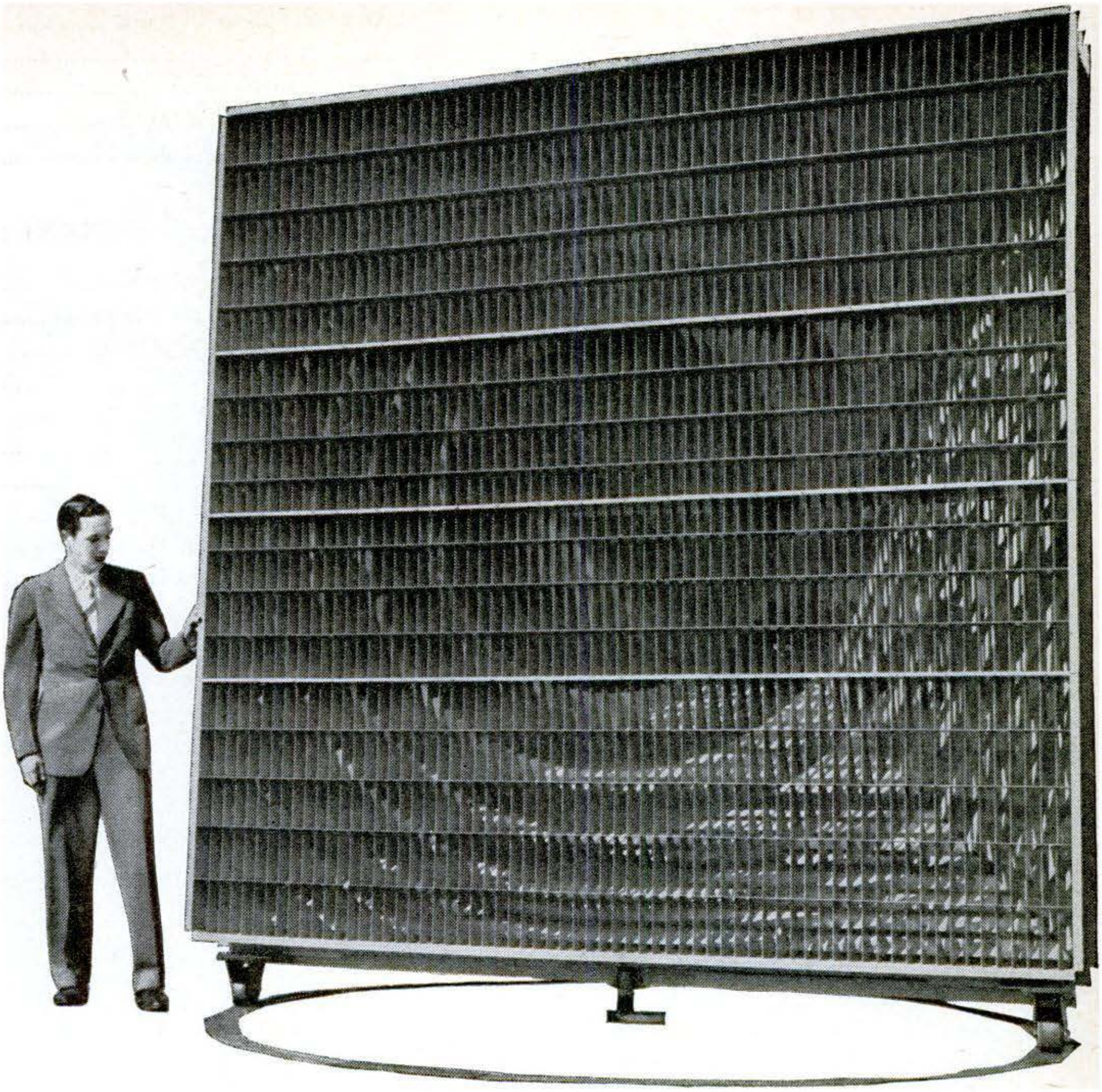

Improving Record Players....188
Filter Increases Pickup Range....191
"Third Hand" for Serviceman....191
News in Electronics....192
Racking Hot Soldering Irons....196
Plastic Paint Insulates Tools....196


## DEPARTMENTS


Voice of Science.... 7
Letters.... 16
New Tools....119
March of Science....121
Home Owners....136
Modern Living....149
Craftsmen at Work....153
What's Your Ingenuity Quotient?....157
Keeping the Home Shipshape....160
Editorial Memo....278




Copyrighted material



## • A "SEARCHLIGHT" TO FOCUS RADIO WAVES

In the new microwave radio relay system between New York and Boston, which Bell Laboratories are developing for the Bell System, giant lenses will shape and aim the wave energy as a searchlight aims a light beam.

This unique lens—an array of metal plates—receives divergent waves through a waveguide in the rear. As they pass between the metal plates their direction of motion is bent inward so that the energy travels out as a nearly parallel beam. At the next relay point a similar combination of lens and waveguide, working in reverse, funnels the energy back into a repeater for amplification and retransmission.

A product of fundamental research on waveguides, metallic lenses were first developed by the Laboratories during the war to produce precise radio beams.

But how to focus waves is only one of many problems that Bell Telephone Laboratories are working on to speed microwave transmission. The goal of this and all Bell Laboratories research is the same — to keep on making American telephone service better and better.

**BELL TELEPHONE LABORATORIES**

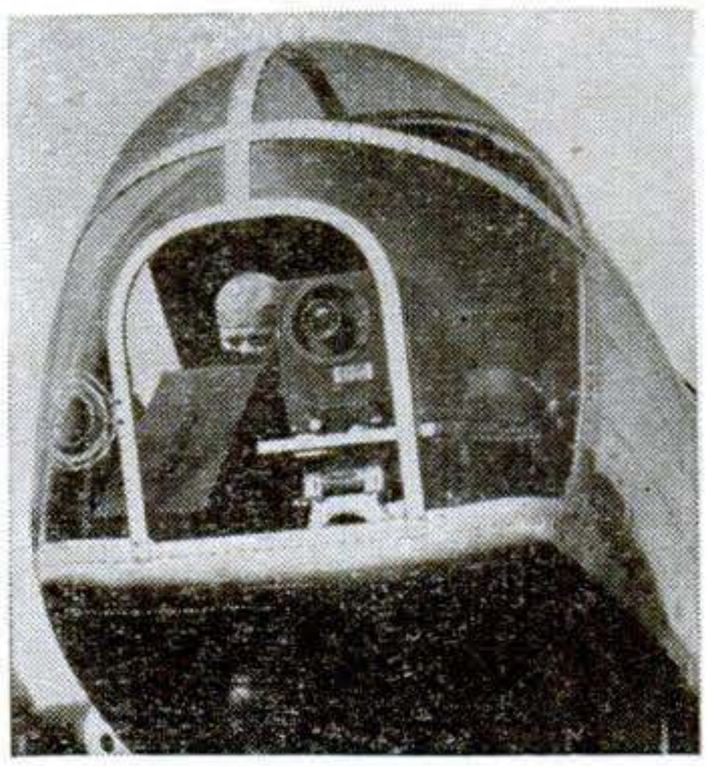
***Exploring and inventing, devising and perfecting for continued improvements and economies in telephone service***



Copyrighted material

*RCA airborne television will bring you thrilling news events that could not otherwise be "covered"—while they are happening.*

# You'll see news in the making— through Television



**A television "eye" in the nose of a plane! Besides covering news events, by plane, automobile or boat, such equipment, developed by RCA and NBC, can make extremely accurate geographical surveys from planes flown by remote control. Moreover, similar television equipment can be used to observe hazardous manufacturing processes from a safe distance.**

**Imagine! A helicopter is "covering" the story of a man marooned on a burning building. Sitting at your home television receiver, you will get the same eye-witness view as though you were riding along in the nose of the plane!**

**To develop equipment compact enough to fit into a plane was a major problem. But RCA-NBC scientists and engineers in cooperation with the U. S. Navy did it—and airborne television became a wartime reality.**

**This portable equipment has many peacetime uses—and may lead to development of a "walkie-lookie" with which a radio or news reporter might cover a story by television as readily as a news photographer does now with a camera.**

**Such progress-making research goes into each and every RCA product—and is your assurance that anything bearing the RCA or RCA Victor emblem is one of the finest instruments of its kind that science has achieved.**

• • •

*Radio Corporation of America, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 4:30 P.M., Eastern Time, over the NBC Network.*

**RADIO CORPORATION of AMERICA**



Copyrighted material

POPULAR SCIENCE MONTHLY

VOICE OF SCIENCE

(A Statement by the Editor of Popular Science Monthly)

# DON'T Arrest Science, GENERAL!

EARLY this year, the editors of this magazine initiated an investigation into atomic medicine as one of the first and perhaps most valuable by-products of the two-billion-dollar Manhattan Project. We knew that man's ills and pains are not popular unless they are personal. We knew that to get and to print the story would be difficult. But we also knew that the story had to be told, not only for itself, but as a test of the availability of all the vital and valuable non-military information the scientist's searches and the people's money had purchased.

We assigned an able writer, Carl Dreher, whose own military experience made him very conscientious about military security. He researched and wrote a rounded and stimulating story. This was shown to some 40 scientific and medical people for their opinion. Their approval of the need and the article was gratifying.

To illustrate the article we could hardly send our own photographers into the secret reaches of Oak Ridge, so we asked the Army to furnish pictures of the non-secret protective devices used in the atomic-bomb plants and freely described in the Smyth Report and the public prints. The photographs were taken and sent to Washington for clearance. At this point General Leslie Richard Groves said, "No." No pictures. No pictures of any kind.

That is why there are blank spaces on page 93. More important, it is why there are blank spaces in the record of medical research. And why radio-iodine, for instance, goes smoking up the stacks of the Manhattan Project plants while thyroid cancer patients cost $10,000 to treat.

Ours is only one of many cases against General Groves. He has larger charges to answer. In the name of military security, he has discouraged every effort to apply the lessons of atomic research to the improvement of the civilian economy. He has blocked every move toward civilian control of atomic processes. And, in his own public testimony, he has convicted himself of a social stupidity that is outstanding even in a military man.

Yet, essentially, our quarrel is not with General Groves but with the generals—with the rubber-stamp minds that cannot, as a result of their leaning and training, answer an all-embracing question with a creative "Yes." We do not advocate that the hard-bought secrets of the atomic bomb be handed to Russia—or Iran. We do not condone treachery in Canada. But neither do we believe that the generals are fit custodians of science. Nothing so big should be controlled by anything less than the total of the people.

Certainly science cannot long endure its present state of arrest.

Perry Gilbreath



Copyrighted material

# BOY IT'S KEEN! A REAL METAL RAPID FIRING "G-BOY" REPEATING CAP PISTOL

- RAPID FIRING! • LOOKS LIKE A REAL "45"
- ACTUALLY SMOKES ON FIRING
- HAS LOUD EXPLOSIVE REPORT

It's a thriller. Yes! Looks and feels like the Automatic "45's" carried by our Army Officers . . . with a plastic "Pearl" handle. Easy to reload. Any boy would gladly give his entire allowance for one of these.

**$1.95**

**ORDER DIRECT . . . TODAY . . . PROMPT SHIPMENT**

Satisfaction is guaranteed. Send check or money order for immediate shipment—express charges collect. (Smallest order $1.00. No C.O.D. orders.)

**UTILITIES STORES, 117 S. Wabash Ave., Dept ED, Chicago 3, Ill.**
I enclose $.....Ship at once via express, charges collect, .....
G-Boy Repeating Cap pistols, .....rolls of caps, and .....holsters.
Name.....
Please Print Name and Address
Street or R.F.D.. .....
City.....State.....
*Established 1906*

# Look! STURDY ALL-METAL SKOOTER SKATE

**Just What the Boys and Girls Have Been Waiting For**

**$2.59** Plus 20c Mailing Charge

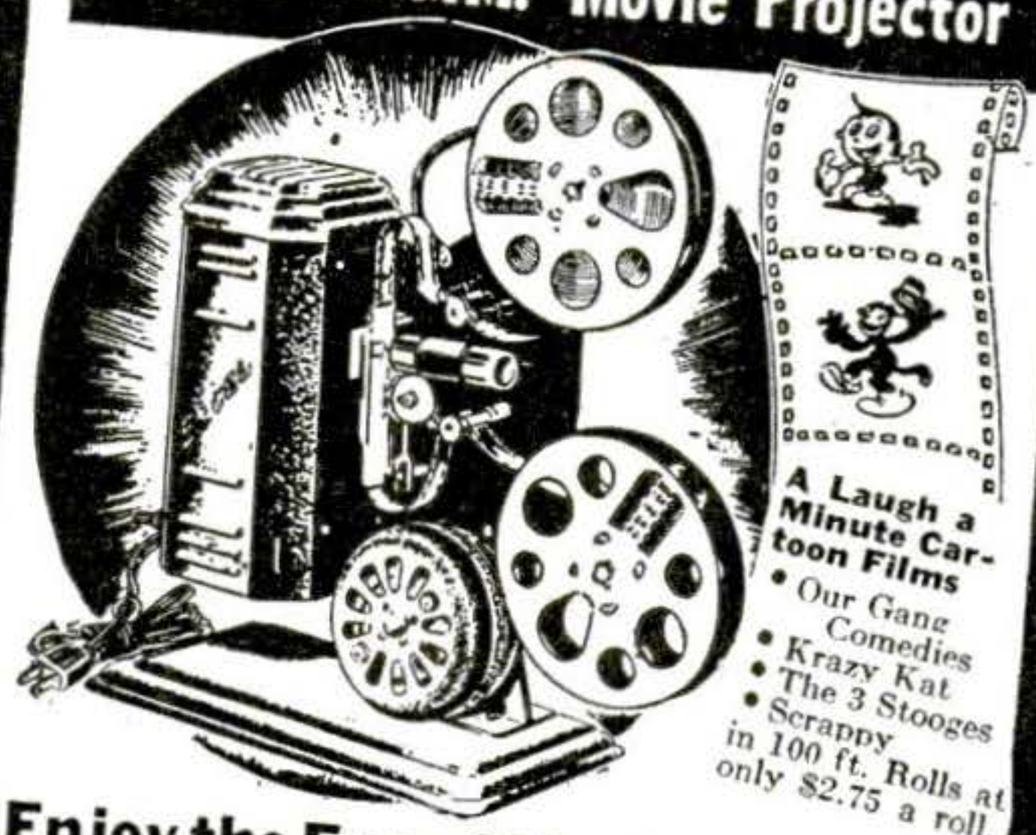
- Yes! It's all metal.
- It has steel ball bearing wheels
- Will take hard wear.

An ideal toy to make children happy and strong. Order several for the nicest children you know.

**ORDER DIRECT — TODAY . . . PROMPT SHIPMENT**

**UTILITY STORES, 117 S. Wabash, Dept. EE, Chicago 3, Ill.**
Enclosed is $_____. Send at once_____
ALL STEEL Skooter Skates at $2.59 each, plus 20c mailing charge.
Name_____ PLEASE PRINT
Street or R.F.D._____
City_____State_____
*Established 1906*

# Now Available! For Immediate Shipment! EXCEL 16 MM. Movie Projector



**A Laugh a Minute Cartoon Films**
- Our Gang Comedies
- Krazy Kat
- The 3 Stooges
- Scrappy

in 100 ft. Rolls at only $2.75 a roll.

## Enjoy the Fun of Movies at Home!

This is the Finest Low-Priced Motor-Driven Projector Available. Comes furnished with a 200 ft. Take-up Reel, 2-inch lens in focusing mount, tilting device, 120-watt lamp, accessible Spring Belt Drive, Motor Driven Rewind, Switch control Motor, Baked on Enamel Finish and Power-House Type Constant speed motor, A.C. only. Shipping wt. 7 lbs.

**FOR ONLY $15.50** (Movie Projector) Plus Postage

**MAIL COUPON NOW!**

**UTILITY STORES, 117 S. Wabash, Dept. EF, Chicago 3, Ill.**
Please ship as indicated below:
_____Excel 16MM Movie Projectors at $15.50 $_____
_____100 ft. Rolls of "Laugh a Minute" Cartoons at $2.75 $_____
for which I enclose $_____ Postage _____
Check Films Wanted: ☐ Krazy Kat ☐ Scrappy ☐ Our Gang Comedies ☐ The 3 Stooges
Name_____
Street or R.F.D._____
City_____State_____



Copyrighted material

# What keeps YOU from making more MONEY?

JUST what is the matter—why aren't you making more money? Look around you. Probably many of the people you know are doing a lot better than you are.

What's the reason?

Your own native ability is probably just as good as theirs—probably nothing wrong with your personality and appearance.

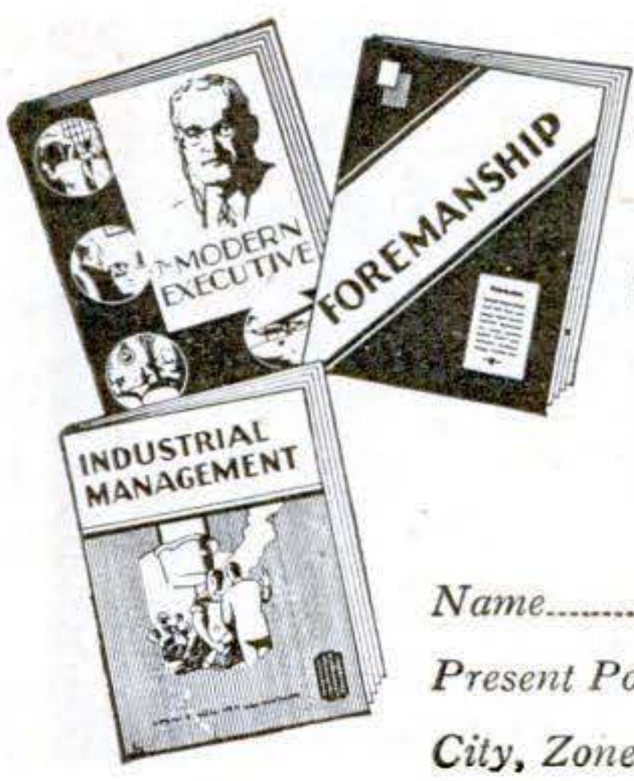
But—*they have something you lack.* The fact that they have a better job and more money proves that. Success in business today is measured by the dollar sign.

The secret is this—the man who prepares himself for the job ahead—is the one who gets advancement and more money. He doesn't need "pull." The man who really has something on the ball—"push" enables him to get what he wants.

Ambitious men and women have found in LaSalle the way to get ahead in business. This has been going on for 38 years. Hundreds of thousands of students have enrolled—our files are full of grateful letters from people who have bettered their earnings and position through LaSalle.

Perhaps we can help you. You should at least find out. The coupon below will bring full information. Just check the field of your choice and we'll send you full information, without obligation—the money making possibilities in that field, and how you can prepare in your spare time at moderate cost.

For a brighter future in the business world—more money and a better job—send the coupon today. Tomorrow you might forget.




## LA SALLE Extension University

***a Correspondence Institution***

**Dept. 583-R Chicago, Ill.**

I want to better my position—make more money. Send me your free booklet on the field I have checked below.

- ☐ **Higher Accountancy**
- ☐ **Foremanship**
- ☐ **Executive Management**
- ☐ **Law: I.L.B. Degree**
- ☐ **Expert Bookkeeping**
- ☐ **Industrial Management**
- ☐ **Traffic Management**
- ☐ **Salesmanship**
- ☐ **Stenotypy (Machine Shorthand)**

*Name*.....*Age*.....

*Present Position*.....

*City, Zone and State*.....

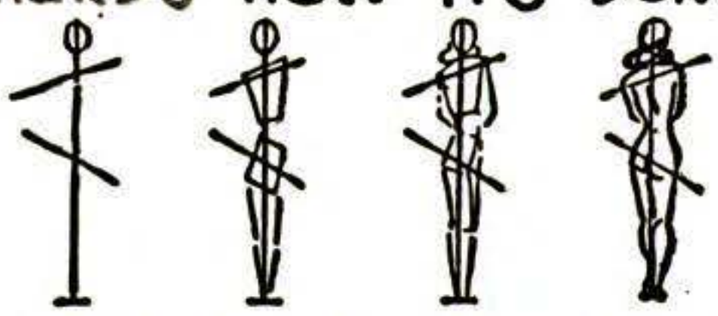


Copyrighted material

# It's Fun to Draw

A COMPLETE SELF-INSTRUCTION COURSE AND REFERENCE BOOK
with over 1000 "How-to-do-it" SKETCHES AND DRAWINGS
*9 Sections—a $9 Value* **All for only $1.00**

HERES HOW IT'S DONE!



Anyone who has learned to write, can learn to draw! This helpful book removes the mysticism that has surrounded art. By reducing the elements of drawing to its simple steps, it teaches THE BEGINNER to draw, and then to advance into more and more difficult subjects.

As you can see from the above illustrations showing the 9 sections—this complete course covers 9 BRANCHES of practical Art. Each division is explained by a specialist. No previous knowledge on your part is expected. Within a few days you will be drawing with an ease and enjoyment you never thought possible. For the experienced and professional artist, it is a REFERENCE BOOK and veritable mine of information.

This book guides you from the first stroke on paper to selling the finished art work. Includes specific instruction, advice, tricks, time-savers, special effects, on: Still Life, Animals, Anatomy, Human Figure, Faces and Portraits, Lettering, Layouts, Cartoons, Animated Cartooning, advertising and Commercial Art, Illustrations for Newspapers, Magazines, Books, Designing Book Jackets, The Use of Color, etc. Teaches you by sketches, diagrams and instructions, how to draw—hands, feet, heads, bodies, ears, noses, mouths, eyes—in different positions, of different sexes and ages, and with different perspective. Shows you how to attain and indicate: action, proportion, balance, composition, shading, rhythm, symmetry: and how to express—laughter, anger, terror, grief, surprise and other emotions. Also, how to draw caricatures, cartoons and comic drawings. Also how to letter, with 37 complete Alphabets shown. Includes a glossary of Art Terms, Supplies, Types of Work, Mediums, etc. Completely and profusely illustrated with over ONE THOUSAND Instructive and Example, Drawings, Sketches and Pictures.

Ordinarily a course of this scope costs much more money, but to make it available to everyone seeking a practical knowledge and enjoyment of Art, we have disregarded costs, and precedents, and have established the special low price of ONLY $1.00 FOR THE COMPLETE COURSE. NOTHING ELSE TO PAY!! It is, undoubtedly, the greatest bargain in the art world today!

ONLY $1 FOR THE COMPLETE COURSE! NOTHING ELSE TO PAY

EXAMINE IT FREE!

You take absolutely no risk—so mail coupon NOW!

Merely mail the coupon below. When your copy of *It's Fun To Draw* arrives—read and test it for 5 days. If, after this examination, it hasn't opened up new paths of fun and artistic ability for you—return it, and it won't cost you a single penny. If you decide to keep it, the FULL PRICE is only $1.00.

MAIL COUPON NOW!

KNICKERBOCKER PUB. CO. Dept. X1
120 Greenwich St., New York 6, N. Y.

Rush me a copy of "IT'S FUN TO DRAW". If not delighted, I may return book and get my money back.

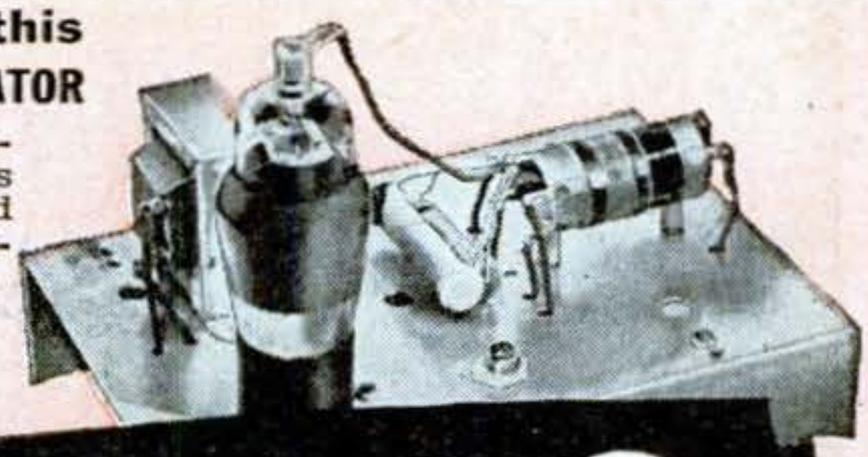
☐ I enclose $1.00 in full payment. Send postpaid.
☐ Send C.O.D. I will pay postman $1.00 plus postage.

Name _____
Address _____
City & State _____




Copyrighted material

**Building this A. M. SIGNAL GENERATOR** gives you valuable experience. Provides amplitude-modulated signals for test and experiment purposes.



**RADIO SERVICING** pays good money for full time work. Many others make $5, $10 a week EXTRA fixing Radios in spare time.

# Learn RADIO by PRACTICING in Spare Time

## with 6 Big Kits of Radio Parts I Send You

Let me send you facts about rich opportunities in Radio. See how knowing Radio can give you security, a prosperous future. Send the coupon for FREE 64-page book, "Win Rich Rewards in Radio." Read how N.R.I. trains you at home. Read how you practice building, testing, repairing Radios with SIX BIG KITS of Radio parts I send you.

### Future for Trained Men Is Bright in Radio, Television, Electronics

The Radio Repair business is booming NOW. There is good money fixing Radios in your spare time or own full time business. Trained Radio Technicians also find good pay opportunities in Police, Aviation, Marine Radio, in Broadcasting, Radio Manufacturing, Public Address work, etc. Think of the boom coming now that new Radios can be made! Think of even **greater** opportunities when Television and Electronics are available to the public!

### Many Beginners Soon Make $5, $10 a Week EXTRA in Spare Time

The day you enroll I start sending EXTRA MONEY JOB SHEETS to help you make EXTRA money fixing Radios in spare time while learning. You LEARN Radio principles from my easy-to-grasp Lessons—PRACTICE what you learn by building real Radio Circuits with Radio parts I send—USE your knowledge to make extra money in spare time.

### Mail Coupon for Free Copy of Lesson and 64-Page Illustrated Book

I will send you FREE a sample lesson, "Getting Acquainted with Receiver Servicing," to show you how practical it is to train for Radio in spare time. With it I'll send my 64-page, illustrated book, "Win Rich Rewards in Radio." Just mail coupon in an envelope or paste it on a penny postal.—**J. E. SMITH, President, Dept. 6EP3, National Radio Institute, *Pioneer Home Study Radio School*, Washington 9, D. C.**

***My Course Includes Training in***

**TELEVISION ★ ELECTRONICS**

**You build this MEASURING INSTRUMENT** yourself early in the course—use it for practical Radio work on neighborhood Radios to pick up EXTRA spare time money!

**You build this SUPERHETERODYNE CIRCUIT** that brings in local and distant stations. You get practical experience putting this set through fascinating tests.

## BE A SUCCESS in RADIO I Will Train You at Home

## Sample Lesson FREE

**Gives hints on Receiver Servicing, Locating Defects, Repair of** Loudspeaker, **I.F. Transformer,** Gang Tuner, **Condenser, etc., 31** illustrations. Study **it**—keep it—**use it**—without obligation! Mail coupon NOW for your copy!

## GET BOTH 64 PAGE BOOK SAMPLE LESSON FREE

**MR. J. E. SMITH, President, Dept. 6EP3**
**National Radio Institute, Washington 9, D. C.**
Mail me FREE, without obligation, Sample Lesson and 64-page book about how to win success in radio and Television — Electronics. (No salesman will call. Please write plainly.)

Age.....

Name.....

Address.....

City.....Zone....State.....4FR

( ) If you are a war veteran, check here



Copyrighted material

# The Magic of Mind

WERE the great personages of the past victims of a stupendous hoax? Could such eminent men of the ancient world as Socrates, Pericles, and Alexander the Great have been deluded and cast under the spell of witchcraft—or did the oracles whom they consulted actually possess *a mysterious faculty of foresight?* That *the human mind can truly exert an influence over things and conditions* was not a credulous belief of the ancients, but a known and demonstrable fact to them. That there exists a wealth of infinite knowledge just beyond the border of our daily thoughts, which can be aroused and commanded at will, was not a fantasy of these sages of antiquity, but a dependable aid to which they turned in time of need.

It is time you realized that the rites, rituals and practices of the ancients were not superstitions, but subterfuges to conceal the marvelous workings of natural law from those who would have misused them. Telepathy, projection of thought, the materializing of ideas into helpful realities, are no longer thought by intelligent persons to be impossible practices, but instead, *demonstrable sciences,* by which a greater life of happiness may be had.

One of America's foremost psychologists and university instructors, says of his experiments with thought transference and the powers of mind—"The successes were much too numerous to be merely lucky hits and one can see no way for guessing to have accounted for the results." *Have you* that open-minded attitude of today which warrants a clear, positive revelation of the facts of mind which intolerance and bigotry have suppressed for years? *Advance with the times;* learn the truth about your inherited powers.

## *Let this free book explain*

The Rosicrucians (NOT a religious organization) have been leaders in introducing the ancient wisdom of mental phenomena. Established throughout the world for centuries, they have for ages expounded these truths to those thinking men and women who sought to make the utmost of their natural faculties. Use the coupon below—avail yourself of a pleasing book of interesting information which explains how you may acquire this most *unusual* and *helpful knowledge.*

## *The* ROSICRUCIANS
## (AMORC)

USE THIS COUPON

Scribe B.V.V.
The Rosicrucians, AMORC,
San Jose, California.

I am sincerely interested in knowing more about this unseen, vital power which can be used in acquiring the fullness and happiness of life. Please send me, without cost, the book, "THE MASTERY OF LIFE," which tells me how to receive this information.

Name _____

Address _____ State _____



Copyrighted material

# Stop DAY-DREAMING about getting a New Body!

# Start Now! Let Me Prove I Can Make You a NEW MAN

IN ONLY 15 MINUTES A DAY I can put a handsome, rippling coat of muscle all over your body! *Wishing* for super-human strength and red-blooded vigor won't GIVE them to you You may be sick and tired of letting other, huskier fellows "lord it over you"—but until you're willing to DO something about it, you'll never get anywhere!

But if you'll give *me* just FIFTEEN MINUTES A DAY—I'LL PROVE I CAN BUILD YOU A POWERFUL NEW BODY! I can make you feel so *strong* and *alive* you'll laugh at fatigue! Let me give you a battering-ram punch, develop your shoulders and back into a tough wall of solid muscle, build you a tough, supple belt of punch-proof stomach muscles, re-make your legs into young "tree trunks" of strength and flexibility. Let me pump *real HE-MAN power* into every part of your body. INSIDE AND OUTSIDE! Only 15 minutes a day—right in your own home!—is all I ask. And there's no cost if I fail.

### What's My Secret?

*"Dynamic Tension!"* That's the ticket! The identical *natural* method that I myself developed to change my body from a scrawny, skinny-chested weakling to my present prize-winning physique! Thousands of other fellows are becoming marvelous physical specimens —*my way* —*"Dynamic Tension."* You simply utilize the DORMANT muscle-power in your own God-given body—watch it increase and multiply double-quick into real, solid LIVE MUSCLE.

Just think what that will mean! You'll no longer have to stand back and let *other* fellows walk off with the prettiest girls, step into the best jobs, grab the spotlight at every party. YOU can now have the kind of handsome, healthy body and red-blooded HE-MAN VITALITY that spells SUCCESS in every way! You just won't be able to HELP attracting admiring looks wherever you go—winning instant attention—steadily forging ahead in life!

My method —*"Dynamic Tension"*—will turn the trick for you. No *theory* —every exercise is *practical*. And, man, *so easy!* Spend only 15 minutes a day in your own home. From the very start you'll be using my method of *"Dynamic Tension"* almost unconsciously every minute of the day—walking, bending over, etc.—TO BUILD MUSCLE and VITALITY.

Charles Atlas

*—actual untouched photo of the man who holds the title, "The World's Most Perfectly Developed Man"*

## FREE BOOK

### "EVERLASTING HEALTH AND STRENGTH"

In it I talk to you in straight-from-the-shoulder language. Packed with inspirational pictures of myself and pupils—fellows who became NEW MEN in strength, my way. Let me show you what I helped THEM do. See what I can do for YOU! For a real thrill, send for this book today. AT ONCE, CHARLES ATLAS, Dept. 1E, 115 E. 23rd St., New York 10, N. Y.

**CHARLES ATLAS, Dept. 1E**
**115 E. 23rd St., New York 10, N.Y.**

I want the proof that your system of *"Dynamic Tension"* can help make me a New Man—give me a healthy, husky body and big muscle development. Send me your FREE book, "Everlasting Health and Strength." No obligation.

Name .....
(Please print or write plainly)

Address .....

City ..... State .....

☐ Check here if under 16 for Booklet A



Copyrighted material

# INVEN

## NOW IS THE TIME TO PATENT AND SELL YOUR INVENTION

**Now, more than ever before, is the right time to patent and sell your invention. Why? Because manufacturers everywhere, in striving to keep ahead of competition, are looking for new inventions and buying up the patent rights thereon so that they will have better and more attractive items to make and sell. Hence, the wise thing for you to do is also to act at once. Protect your invention—and yourself—by applying for a patent now.**

## FREE "PATENT GUIDE" EXPLAINS WHAT TO DO

Our Free 48 page "Patent Guide for the Inventor", containing complete information about patent procedure and selling inventions, answers many important questions concerning Patents that inventors constantly ask. It tells what facts, details, drawings, sketches, etc., are necessary to apply for a Patent; how to protect your invention through dated and witnessed disclosure; how to do this at once to safeguard your rights; how Patent Office Records can be checked to determine whether the invention is probably patentable before filing fees need be paid; discusses costs involved and a practical way these can be paid as the application progresses. It tells how some inventors secured financial backing; how many simple inventions have proved large commercial successes; how Patents covering improvements also can be profitably utilized and marketed; and countless other facts that every inventor will want to know. And in addition, our "Patent Guide" contains illustrations of over 150 basic mechanical movements.

## WHY YOU NEED EXPERT ASSISTANCE

The Patent Laws were enacted for your benefit—to give you protection for the features of your invention which are Patentable. But these features must be legally and concisely set forth in the form of "claims". This phase of the procedure is so complex that the U.S. Patent Office advises the Inventor to engage a competent Registered Patent Attorney. We maintain a large staff—carefully trained registered patent attorneys—expert draftsmen—experienced searchers—to serve you. We have been serving inventors for more than twenty years. Write for a free copy of our "Patent Guide for the Inventor" today. Clarence A. O'Brien & Harvey B. Jacobson, Registered Patent Attorneys. **62-E** Adams Building 4, Washington, D. C.

**CLARENCE A. O'BRIEN & HARVEY B. JACOBSON**

REGISTERED PATENT ATTORNEYS



Copyrighted material

# Free Book for TOPICS

**48 PAGES**
*Over 150 Mechanical Movements*

## FREE
## "RECORD OF INVENTION"

With our free "Patent Guide for the Inventor" you will receive also free a "Record of Invention" form. This "Record of Invention" enables you to conveniently make a proper, dated disclosure of your invention before you file your patent application, which will prove of great value to you, should the occasion for evidence arise.

## TAKE FIRST STEP NOW

Remember, in Patent matters action is important. Delay can be costly. Therefore, take your first step now—toward protecting your invention. Send for your free copy of our "Patent Guide for the Inventor" containing complete information about patent procedure and selling inventions. At the same time, receive a free "Record of Invention" form with complete instructions for making a disclosure of your invention and establishing its date. This step costs you nothing—yet may be vital to your success. Mail the coupon in an envelope, or paste it on a penny postcard—now.

*Worthy of Your Trust*

## CLARENCE A. O'BRIEN & HARVEY B. JACOBSON

**CLARENCE A. O'BRIEN & HARVEY B. JACOBSON**
**Registered Patent Attorneys before the United States Patent Office**
**62-E Adams Building, Washington 4, D. C.**

Please send me your 48-Page "Patent Guide for the Inventor" and your specially prepared "Record of Invention" form FREE. This request does not obligate me.

Name.....

Address.....

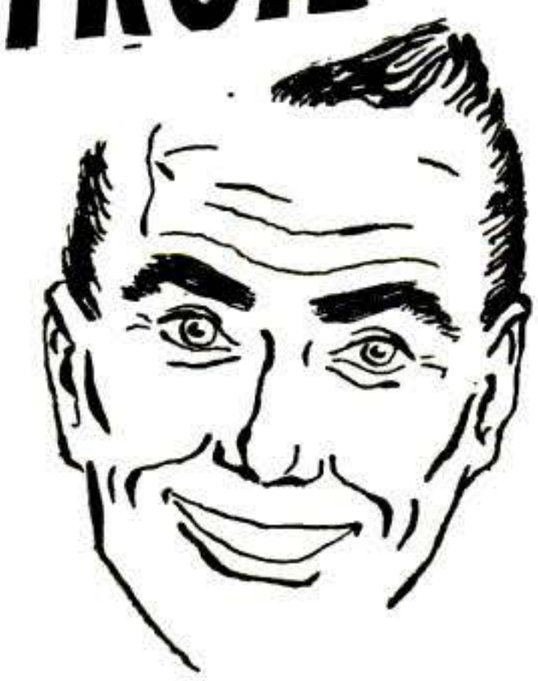
City ..... State.....

**(Please write or print plainly.)**



Copyrighted material

# when you say... "ADD PYROIL"



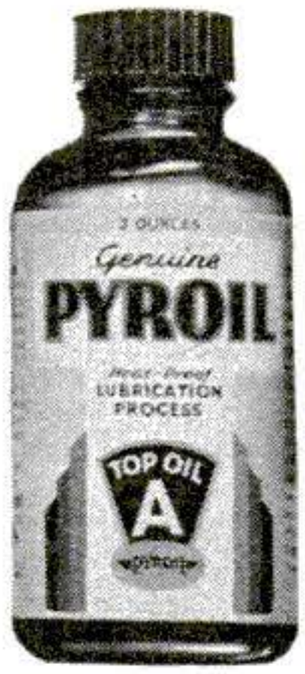
**... these good things happen to your car.**

• • • You provide a constant protective film of lubrication to cylinders and pistons. No metal to metal contact.

• • • Pyroil reduces wear due to friction. Permits easy starting . . . reduces battery drain.

• • • Pyroil protects cylinder walls from rust and corrosion.

• • • Pyroil frees away sludges and gums and reduces carbon formation.




**PYROIL FOR AIRCRAFT ENGINES**

Use Aircraft Pyroil B for lubricating oil, Aircraft Pyroil A for gasoline.

**Manufactured and Guaranteed by Pyroil Company, W. V. Kidder, Founder, 134 Main Street, La Crosse, Wis.**

**PYROIL COMPANY**
**134 Main Street, La Crosse, Wisconsin**

I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.

Name.....

Address.....

City or Town.....State.....

Jerry, the talking dog, is entertaining hospitalized veterans, by courtesy of the PYROIL COMPANY. Picture of Jerry, sent on request.


# LETTERS

## Lost Scientists

Sir:

Having just read your article on the "Lost Generation of Scientists" (PSM, Mar. '46, p. 88), I am writing to tell you of a case very dear to me, my own. I began college in September 1941 and received at the end of three years a most coveted B.S. degree in chemistry. . . . As a consequence of my induction on August 28, 1945, I lost a $1,200 fellowship. Also, I lost seven semester hours credit for my M.S. degree. . . . I estimate that because of my six months, thus far, in the Army, I have lost a year of work towards the advanced degrees I was striving for . . . Right now I am awaiting overseas shipment as a clerk, nontypist.

PVT. HARVEY N. HANTZES

Kearns, Utah

Sir:

My 18-year-old son left today to be inducted. In looking over his magazines, I read your article, "Lost—A Generation of Scientists." I think it was fine and true.

Now I appeal to you to help me get my son back in Purdue while he is still young and burning with the desire to become a scientist. He has completed three semesters and won the "distinguished student" honor.

(Name withheld by the editors)

*There is little PSM can do in an individual case. But to speed recognition of the total problem, reprints of the article in question have been sent to each Representative and Senator. In addition, reprints have been sent to several hundred outstanding scientists in the belief that it will provide them with an additional instrument in publicizing the gloomy prospect of America's scientific future.*

## Warns of Rot

Sir:

. . . There are a great number of organizations of "atomic scientists," and of scientists in this or that project, (which) have been formed since the atomic bomb became public. Some of these represent impartial scientific opinion, and others are groups of citizens who happen to be men of science and believe strongly that some particular solutions of the problems should be adopted . . . I quite agree with you that the atomic scientist is up to his neck in politics nowadays, and cannot help it, but an awful lot of rot has



Copyrighted material

# *This* FREE BOOK *Helps..*

# INVENTORS TO PROTECT THEIR INVENTIONS

**MODERN BUSINESS WANTS INVENTIONS** Practical and novel inventions are in big demand today. The opportunity for quick money is enticing. Sales sources are many if your invention has merit. But, be *sure*—before you place your device in strange hands—that it is fully protected. A United States Patent gives you this protection. *The first step toward inventive success always is—and always has been—the application for a U. S. Patent. There is no other way to protect your invention in accordance with the laws of this country.*

**MAKE THIS RECORD NOW** If you have an invention, and wish to secure it for the future, act at once. Have it dated now and recorded in our office. We will send you this FREE Invention Record Form for the purpose. Fill out the Invention Record Form fully describing the nature of your invention. Make a sketch of its main features. Mail it to us and we will record the date it was received in our office. The earlier the date the better your chance of combating rival inventors who may lay claim to your idea later. *Don't delay a single minute in taking this important step. Your whole future may depend upon it. Mail the coupon for our FREE Invention Record Blank and New FREE Book Today!*

**HOW WE SERVE YOU AS REGISTERED PATENT ATTORNEYS** The U. S. Patent Office strongly recommends—unless the inventor is familiar with such matters—that he employ the services of a Registered Patent Attorney in the preparation of his Patent Application. We are Registered Patent Attorneys fully qualified to represent you at the Patent Office. We have had long experience in studying hundreds of types of inventions. This gives us the ability to judge your invention and to describe it accurately and convincingly in technical language. It gives us the perception to center arguments upon those details of your invention which, in our judgment, will be looked upon most favorably by the Patent Office Examiner.

Mail the coupon today for our new FREE Book, "How to Protect, Finance and Sell Your Invention," and our FREE Invention Record Form—maybe this step will pave the way to future security for you and your family. Act Today!

We paint no glowing road to fortune—*but if you have an invention . . . if it serves a definite new need . . . if the public accepts it*—we can tell you it may provide the security and benefits you are seeking.

**McMORROW, BERMAN & DAVIDSON**
*Patent Attorneys*
**142-P Atlantic Building**
**Washington 4, D. C.**

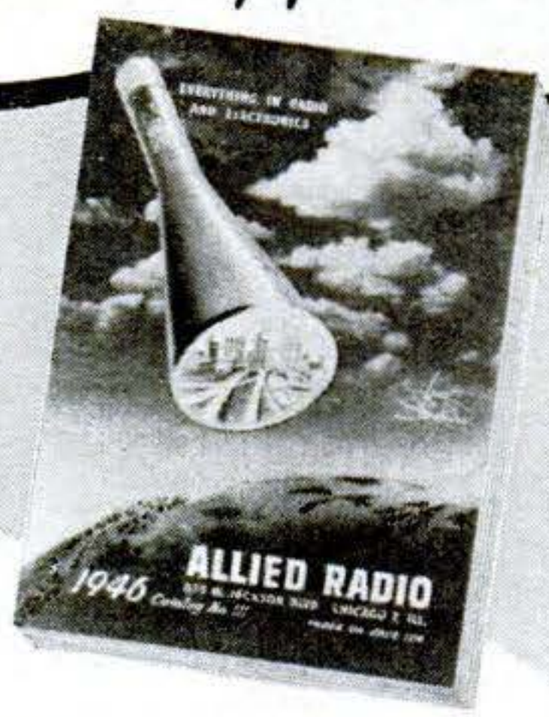


Copyrighted material

NEW and Ready for you

ALLIED'S 1946 CATALOG of Radio and Electronic Supplies

FREE Send for it NOW




BRINGS YOU LATEST, finest values in Radio! New receivers, phono-radios, Ham gear, parts, tubes, kits, code apparatus, tools, books, test instruments, public address—all types of equipment. Over 10,000 items. Leading makes. Guaranteed quality. Fastest service from the world's largest and most complete stocks under one roof. Send for your free copy of Allied's new 1946 Buying Guide now. *Save time and money.*

HELPFUL RADIO BOOKS

Radio Formulas & Data No. 37-752.....10c
Dictionary of Radio Terms No. 37-751..10c
Radio Circuit Handbook No. 37-753....10c
Radio Builders' Handbook No. 37-750...10c
Simplified Radio Servicing No. 37-755. 10c
Radio Data Handbook No. 37-754.....25c
ALL SIX BOOKS No. 37-799.....75c
Parallel Resistance and Series Capacitance Calculator. No. X37-960...25c
R-F Resonance and Coil Winding Calculator. No. 37-955....25c

ALLIED RADIO

ALLIED RADIO CORP.
833 W. Jackson Blvd., Dept. 7-EE-6
Chicago 7, Illinois

Date.....

☐ Send FREE 1946 CATALOG
☐ Send.....Books Calculator No.....
Calculator No..... {$.....enclosed

Name.....

Address.....

City.....Zone.....State.....

been published by people speaking in the name of science.

HENRY NORRIS RUSSELL
Princeton University Observatory
Princeton, N. J.

*To Dr. Russell, astronomer, author, and winner of many medals, PSM wishes to say that it proposes to spot the rot.*

## "Ivory Tower" Leans

Sir:

I like your statement: "The scientist must learn the language of the people" . . . There are signs that the exclusiveness of the language of the "ivory tower" is becoming obsolete.

ERNEST F. W. ALEXANDERSON
Schenectady, N. Y.

*With Edison Medal winner and General Electric scientist Alexanderson, PSM agrees that Hiroshima and the "ivory tower" were destroyed in one fell blow.*

## Believed in Brodie

Sir:

I noted an inaccurate reference to the National Inventors Council on page 98 of the March 1946 issue of Popular Science: ". . . the National Inventors Council and the Navy—to whom the idea was first submitted—refused to believe it."

. . . The Council certainly did believe in the Brodie System. This is evidenced by the fact that it was selected from the gross volume of ideas received and brought to the attention of the Army Air Forces and the Navy Department. I am sure that both of these services also believed in the technical feasibility of the project, but at that time could not see how it fitted in with their existing research program.

The National Inventors Council is not empowered to develop inventions brought to our attention. We are charged with the function of sifting potentially valuable and technically feasible ideas from the vast volumes received. The selected fraction is brought to the attention of the appropriate military groups for their investigation. We are not authorized and do not attempt to control their findings . . .

J. C. GREEN
Washington, D. C.

*Mr. Green, as Chief Engineer of the National Inventors Council, speaks with authority.*

## Smallest Houses

Sir:

In your March issue of 1946 there is an article on page 157 headed, "There's no place like home," about the Jay Barnums living in the smallest home in crowded Greenwich



Copyrighted material

## AUDELS REFRIGERATION & AIR CONDITIONING GUIDE.....$4

New from Cover to Cover—1280 Pages, Fully Illus. Covering basic principles, servicing, operation & repair of household, commercial & industrial refrigeration & air conditioning. A gold mine of essential important facts for engineers, servicemen, users.

## AUDELS CARPENTERS & BUILDERS GUIDES—4 Vols. .....$6

A practical illustrated trade assistant on modern construction for carpenters, joiners, builders, mechanics and all woodworkers. 4 vols., 1600 pages, 3700 illustrations, flexible covers. Pocket size. Each volume sold separately $1.50 a vol.

## AUDELS AUTOMOBILE GUIDE.....$4

A practical quick ready reference book for auto mechanics, service men, operators & owners. Explains theory, construction & servicing of modern motor cars, trucks, buses & auto type Diesel engines. 1540 pages, fully illustrated. 55 chapters. Indexed. A standard book for mechanics. New fluid drive covered.

## AUDELS DIESEL ENGINE MANUAL.$2

A practical, concise treatise with questions and answers on the theory, operation and maintenance of modern diesel engines including General Motors 2 cycle Diesel. 384 pages, fully illus., flexible binding, pocket size. All details plainly brought out, this book is of extreme value to engineers, operators & students.

## AUDELS WIRING DIAGRAMS.....$1

210 Pages. Illustrated. Gives practical facts on wiring of electrical apparatus. It shows clearly how to wire apparatus for practically all fields of electricity. Each diagram is complete & self-explanatory. Highly Endorsed Pocket Companion.

## AUDELS PLUMBERS & STEAMFITTERS GUIDES—4 Vols. .....$6

A Practical Trade Assistant & Ready Reference. Explains in plain language & by clear illustrations, diagrams, charts, graphs, pictures principles of modern plumbing practice including Marine Pipe Fitting and Air Conditioning. 4 Vols.—1670 Pages—3642 Diagrams. Pocket size. Each Vol. Sold Separately $1.50 a Vol.

## AUDELS SHEETMETAL WORKERS HANDY BOOK.....$1

Practical inside information. Fundamentals of Sheet Metal Work. 388 pages. Illustrated. 11 sections. Clearly written. Essential & important facts, figures, pointers in everyday language. Ref. Index.

## AUDELS SHEETMETAL PATTERN LAYOUTS.....$4

Developed by Experts for Sheet Metal Workers, Layout Men & Mechanics. A Practical Encyclopedia in 10 Sections, size 7 x 10 x 2—1125 Pages—350 Layouts—1600 Illustrations. 1001 Key Facts. Fully indexed for ready reference in answering your layout problems. Covers all phases of sheet metal work including Pattern Cutting, Pattern Development & Shop Procedure.

## AUDELS ANSWERS ON BLUE PRINT READING.....$2

For Mechanics & Builders. Covers all types of blue print reading including ship & airplane. 376 pages, fully illustrated.

## AUDELS NEW MACHINIST & TOOLMAKERS HANDY BOOK....$4

Covers modern machine shop practice in all its branches. 5 practical books in 1. New from cover to cover. Tells how to set up & operate lathes, screw and milling machines, shapers, drill presses and all other machine tools. 1600 pages, fully illustrated, 5 x 6½ x 2. Indexed. 5 sections. 1—Modern Machine Shop Practice. 2—Blue Print Reading & How to Draw. 3—Calculations & Mathematics for Machinists. 4—Shop Physics. 5—How to Use the Slide Rule. 60 chapters. Easy to read and understand. A shop companion that answers your questions.

## AUDELS MATHEMATICS & CALCULATIONS FOR MECHANICS $2

Mathematics for home study or reference. 700 pages, 550 illus. Practical mathematics from beginning. How to figure correctly. Easy, correct methods covering a complete review. Ill. & Indexed.

## AUDELS HANDY BOOK OF PRACTICAL ELECTRICITY .....$4

For maintenance engineers, electricians & all electrical workers. 1440 Pages, 2600 Illus. Covers important electrical information in handy form—including Marine Wiring, Radio Principles, Welding. Indexed. A Key to a practical understanding of electricity.

## AUDELS RADIOMANS GUIDE.....$4

A key to the practical understanding of radio including Frequency Modulation, Television, etc., Aircraft & Marine Radio. For radio engineers, servicemen, amateurs. 772 pages. 400 Illustrations & Diagrams. Photos. Review Questions & Answers, Reference Index. Authentic, clear, concise.

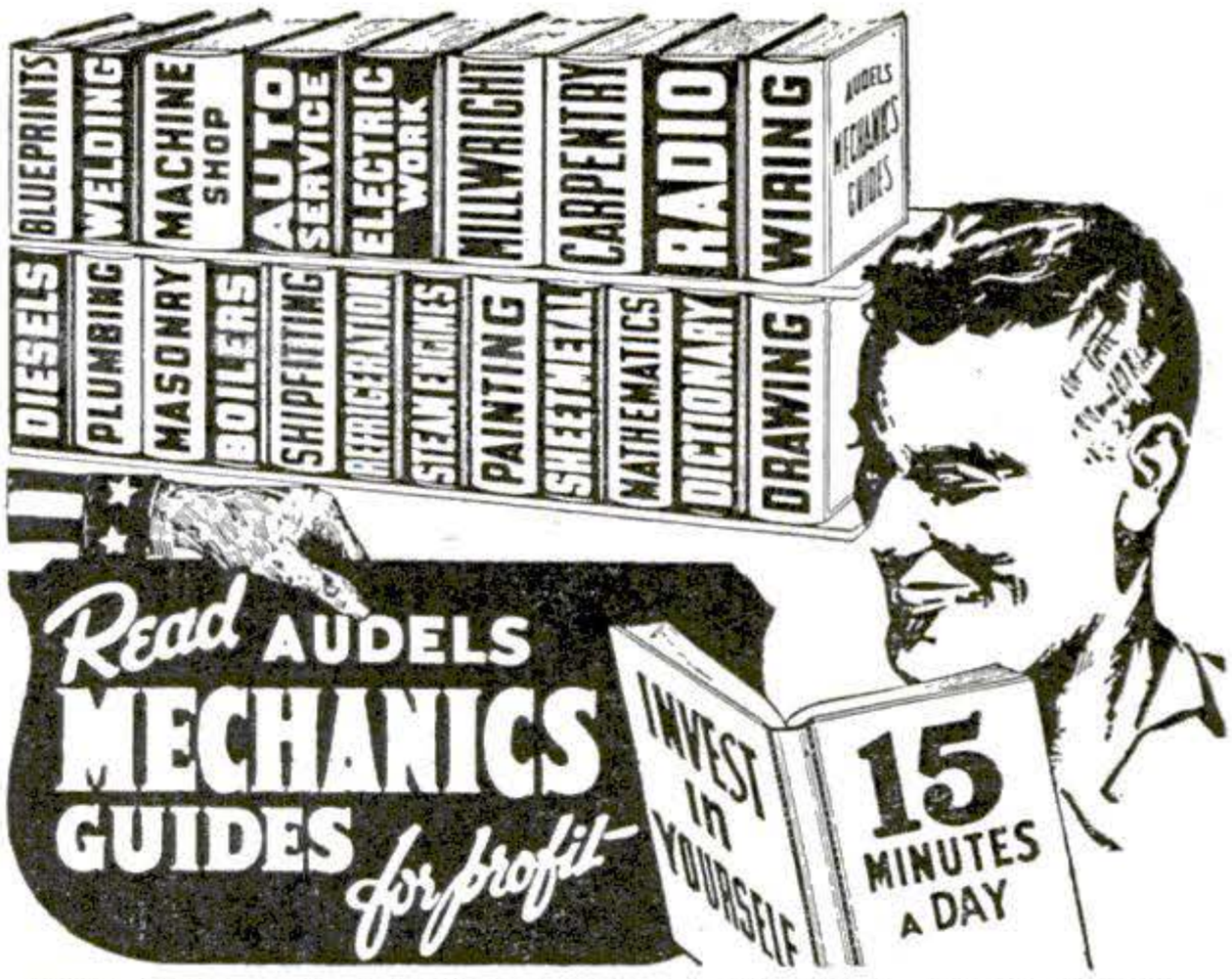
## AUDELS ELECTRONIC DEVICES....$2

Tells What You Want to Know About Electric Eye. Easily Understood. Covers photo-electric cells & their applications. Amplifiers, illumination, frequencies, voltage, photocell, tubes, Ohm's Law, wiring diagrams, etc.

## AUDELS WELDERS GUIDE.....$1

A concise, practical text on operation & maintenance of all welding machines for all mechanics. Over 400 pages, illustrated. Covers all methods of electric and acetylene welding including airplane work.

**AUDEL, Publishers, 49 W. 23 St., N.Y. 10**




## AN AUDEL GUIDE IS A GOOD FRIEND!

Use the brains and experience of others in these Guides of the Trades. Save time and money with right methods, short cuts, labor saving ideas. CHECK NOW! You can look over any Audel Guide in your home. Start the Easy Payments if satisfied.

CUT HERE

# MAIL ORDER

**THEO. AUDEL & CO., 49 W. 23 St., New York 10, N.Y.**

Please mail me for 7 days' free examination the books marked (X) below. I agree to mail $1 in 7 days on each book or set ordered, and to further mail $1 a month on each book or set ordered until I have paid purchase price.

If I am not satisfied with Guides I will return them.

- ☐ Audels REFRIGERATION & Air Conditioning Guide . $4.
- ☐ Audels POWER PLANT ENGINEERS GUIDE . . . 4.
- ☐ Audels PUMPS, HYDRAULICS & AIR COMPRESSORS 4.
- ☐ Audels WELDERS GUIDE . . . . . 1.
- ☐ Audels BLUE PRINT READING . . . . . 2.
- ☐ Audels SHEET METAL WORKERS Handy Book . . 1.
- ☐ Audels SHEET METAL PATTERN LAYOUTS . . . 4.
- ☐ Audels AIRCRAFT WORKER . . . . . 1.
- ☐ Audels MATHEMATICS and CALCULATIONS . . . 2.
- ☐ Audels MACHINISTS & TOOLMAKERS Handy Book . 4.
- ☐ Audels MECHANICAL Dictionary . . . . . 4.
- ☐ Audels AUTOMOBILE GUIDE . . . . . 4.
- ☐ Audels DIESEL ENGINE MANUAL . . . . . 2.
- ☐ Audels MARINE ENGINEERS Handy Book . . . . 4.
- ☐ Audels SHIPFITTERS Handy Book . . . . . 1.
- ☐ Gueths MECHANICAL DRAWING COURSE . . . 1.
- ☐ Rogers DRAWING and DESIGN . . . . . 2.
- ☐ Audels MILLWRIGHTS and Mechanics Guide . . . 4.
- ☐ Audels CARPENTERS and Builders Guides (4 vols.) . 6.
- ☐ Audels PLUMBERS and Steamfitters Guides (4 vols.) . 6.
- ☐ Audels MASONS and Builders Guides (4 vols. ). . . 6.
- ☐ Master PAINTER and DECORATOR . . . . . 2.
- ☐ Audels GARDENERS & GROWERS GUIDES (4 vols.) . 6.
- ☐ Audels ENGINEERS and Mechanics Guides Nos. 1, 2, 3, 4, 5, 6, 7 and 8 complete . . . . . 12.
- ☐ Audels Answers on Practical ENGINEERING . . . 1.
- ☐ Hawkins Aids to ENGINEERS EXAMINATION . . . 2.
- ☐ Audels ELECTRICIANS EXAMINATIONS . . . . 1.
- ☐ Audels WIRING DIAGRAMS . . . . . 1.
- ☐ Audels Handy Book of PRACTICAL ELECTRICITY . 4.
- ☐ Audels ELECTRICAL POWER CALCULATIONS . . 2.
- ☐ Hawkins ELECTRICAL Guides at $1. each . . . . 10.
- ☐ Audels ELECTRONIC DEVICES . . . . . 2.
- ☐ Audels ELECTRIC Dictionary . . . . . 2.
- ☐ Audels RADIOMANS GUIDE . . . . . 4.
- ☐ Audels NEW ELECTRIC LIBRARY at $1.50 a Volume Vols. I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII.

*Name*_____

*Address*_____

*Occupation*_____

P.S.M.

*Employed by*_____



Copyrighted material

# REFRIGERATION AIR CONDITIONING

Air Conditioning and Refrigeration are among the great industries of today and tomorrow. Installations everywhere—in restaurants, shops, homes, etc., need service. Thousands of businesses are waiting for new installations. Today, more and more homes are being air conditioned. The Refrigeration and Air Conditioning industries are headed for greater prosperity and men who have the "know how" and experience should ride along.

## Train Now Before the Expected EXPANSION Begins

Experts predict large demand for men to install and service Air Conditioning and Refrigeration equipment . . . Rise to the kind of job which requires a competent, trained man who can carry the responsibilities of installing costly equipment and maintaining it. If he knows the answer when he is called in for consultation, his reputation grows and his pay should grow also.

**Follow This Way to Knowledge**

If over 17, and under 60, here's all it takes to get you ready for experience in this modern industry. Just invest a limited amount of your spare time—while you are still on your present job. Through our balanced training, you learn first through home study, how to handle Installation, Maintenance & Service Work on Refrigeration and Air Conditioning equipment. Then you can get practical training in our big shops under capable instructors—experienced men who'll take a personal interest in helping you learn. When you're through you should have knowledge that enables you to get started in this vast industry.

**WANT YOUR OWN REPAIR SHOP?**

UEI training is easily understood by mechanically inclined men. You gain experience when you complete your course. Equipment, tools and personal following can accumulate as you progress. Soon you may find it wise to set up your own shop.

**GET FREE FACTS RIGHT NOW!**

It costs you nothing to get all the facts about this great field. Simply mail the coupon below and we'll tell you, without obligation the whole, sensational story of what's ahead in Refrigeration and Air Conditioning. Mail the FREE coupon now.

**UTILITIES ENGINEERING INSTITUTE**
**1314 W. Belden Avenue, Dept. 356, Chicago 14, Ill.**

Please send me the FREE FACTS about opportunities in Air Conditioning and Mechanical Refrigeration. I have marked the one that interests me most.

☐ **Air Conditioning** ☐ **Mechanical Refrigeration**

NAME _____ AGE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____


Village in New York City. It is built on a lot 9′ wide and has a living room 8′ 6″ wide. There is no building code in any city in the United States that allows a 3″ wall.

ELMER A. ZIEMANN

Milwaukee, Wis.

*That is correct. Minimum in New York City is 8″. The Barnum residence actually has no walls of its own. Walls of buildings on either side support its roof and floors. That extra 6″ is devoted to fireplaces and other paraphernalia.*

Sir:

In your March issue . . . you showed a house 8½ feet wide . . . . . Please be advised that at 112½ Rodney Street, Brooklyn, N. Y., there is a brick house 7 feet wide.

W. APPLEBY

Brooklyn, N. Y.

*Our Brooklyn reporter overlooked this novelty. His face is brick red.*

## Distillers

Sir:

The bigger part of my work, as a chemical engineer, has to do with cleaning evaporators and condensers for power steam equipment. A few months ago I ran into two Kleinschmidt-type distillers, the first of their kind I had ever seen—one on an LST and the other on a Navy tugboat.

As it was a rush job, I had no time to send to the maker for a manual on their care and construction. If I had had your article, it would certainly have saved me quite a bit of time in figuring out the water circulating system. Since that time, I have seen the manufacturer's plans. Let me say that those in PSM are much easier to read.

W. C. HUGHES

Richmond, Calif.

*Compliments from practical men like Mr. Hughes are a constant inspiration to the editors who try to make Popular Science the most informative and accurate magazine of its kind.*

## No Excuse, Sir

Sir:

Having done my share of the radio and radar installation work on the *Midway* . . . I could not help but notice your error in the March issue (p. 82). You say that the framework overhanging the side just aft of the five-inch gun is used for lowering boats . . . It is one of the antenna masts . . . which can be lowered or raised at will.

E. W. LAKE

Hampton, Va.

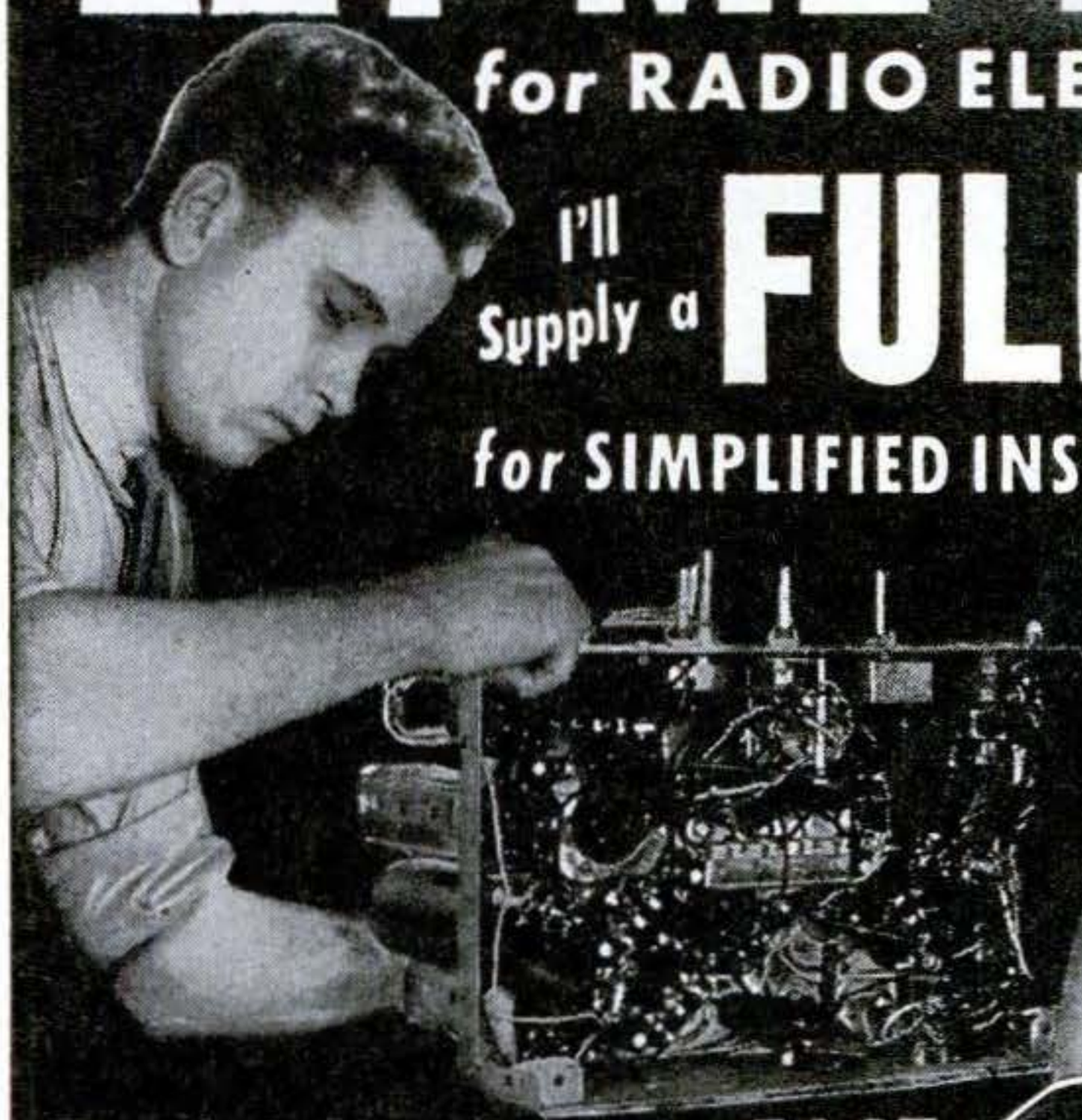
*The PSM editor who handled the Midway picture story spent three years in the Navy ashore, afloat and in the air, but erred about this. He apologizes, sir.*



Copyrighted material

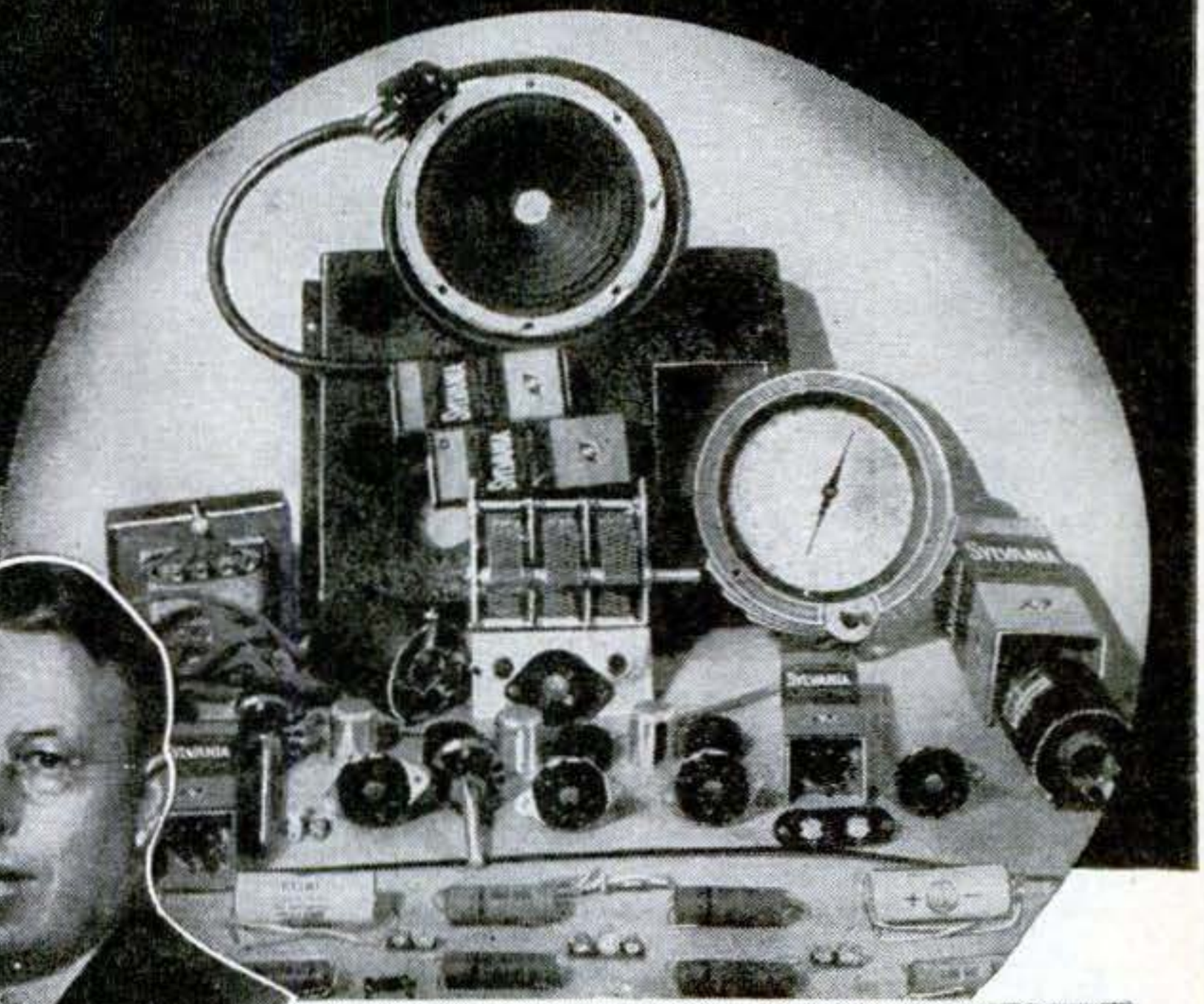
# LET ME TRAIN YOU

## for RADIO ELECTRONICS & TELEVISION



## I'll Supply a FULL RADIO SET

## for SIMPLIFIED INSTRUCTION — PRACTICE & TESTING



**Beginners Learn *FAST***

**START NOW! Big Developments Ahead in F. M., Radar, Television**

## MAKE GOOD MONEY IN a Business of Your Own ...or a Good Radio Job.

The offer I make you here is the opportunity of a lifetime. It's your big chance to get ready for a wonderful future in the swiftly expanding field of Radio-Electronics INCLUDING Radio, Television, Frequency Modulation and Industrial Electronics. Be wise! NOW'S the time to start. Opportunities ahead are tremendous! No previous experience is necessary. The Sprayberry Course starts right at the beginning of Radio. You can't get lost. It gets the various subjects across in such a clear, simple way that you understand and remember. And, you can master my entire course in your spare time.

### You Do Practical Experiments

There's only one *right* way to learn Radio Electronics. You must get it through simplified lesson study combined with actual "shop" practice under the personal guidance of a qualified Radio Teacher. It's exactly this way that Sprayberry trains you . . . **supplying real Radio parts for learn-by-doing experience right at home. Thus, you learn faster, your understanding is clear-cut.**

### I'll Show you a New, Fast Way to Test Radio Sets Without Mfg. Equipment

**The very same Radio Parts I supply with your Course for gaining pre-experience in Radio Repair work may be adapted through an exclusive** Sprayberry wiring procedure to serve for complete, fast, accurate Radio Receiver trouble-shooting. Thus under Sprayberry methods, you do not have one cent of outlay for manufactured Test Equipment.

### Succeed As a Radio-Electronician

My training will give you the broad, fundamental principles so necessary as a background, no matter which branch of Radio you wish to specialize in. I make it easy for you to learn Radio Set Repair and Installation Work. I teach you how to install and repair Electronic Equipment. In fact, you'll be a fully qualified RADIO-ELECTRONICIAN equipped with the skill and knowledge to perform efficiently and to make a wonderful success of yourself

### Read What Graduate Says "One Job Nets About $26.00"

"Since last week I fixed 7 radios, all good-paying jobs and right now I am working on an amplifier system. This job alone will net me about $26.00. As long as my work keeps coming in this way, I have only one word to say and that is 'Thanks' to my Sprayberry training and I am not afraid to boast about it." ADRIEN BENJAMIN, North Grosvenordale, Conn.

### DON'T PUT IT OFF!

**Get the facts about my training—now! Take the first important step toward the money-making future of your dreams. All features are fully explained in my big, illustrated FREE Catalog which comes to you along with another valuable FREE book you'll be glad to own.**

## FREE BOOKS

**"How To Read Radio Diagrams and Symbols"**

. . . a valuable new book which explains in simple English how to read and understand any Radio Set Diagram or circuit. Includes translations of all Radio symbols. Send for this FREE book now, and along with it I will send you another big FREE book describing my Radio-Electronic training.

**RUSH COUPON for BOTH**

**SPRAYBERRY ACADEMY OF RADIO**
**F. L. Sprayberry, President**
**Room 5556, Pueblo, Colorado**

Please rush my FREE copies of "How to MAKE MONEY in RADIO, ELECTRONICS and TELEVISION", and "How to READ RADIO DIAGRAMS and SYMBOLS".

Name.....Age.....

Address.....

City.....State.....

(Mail in envelope or paste on penny postcard)

## MAIL COUPON AT ONCE!



Copyrighted material

# I'll PROVE I can make you, too, TOUGH as a MARINE

.....and add Powerful **POUNDS** and Vital **INCHES** of **DYNAMIC MUSCLE** to your ARMS, LEGS, BACK, CHEST, and SHOULDERS

says

*George F. Jowett*

**WORLD'S GREATEST BODY BUILDER**

**..OR IT WON'T COST YOU A CENT!**

Let me prove to YOU that you can put inches of dynamic muscles on your arms! Add inches to your chest! Broaden your shoulders and power-pack the rest of your body. I can do for you what I've done for thousands the world over, including many officers and men now in the U. S. and British Armed Forces!

**GIVE ME 10 MINUTES A DAY!**

**I'll Show You My Secrets Of Body Building**

I'll help you learn the "Progressive Power Method" through which I rebuilt myself from a physical wreck to the holder of more strength records than any other living athlete or teacher! No matter how skinny or flabby you are, you can learn my methods right in your own home. Through my proved secrets I show you how to develop your power, inside and out, until YOU are fully satisfied that you are the man you want to be. "The Jowett System," says R. F. Kelly, Physical Director of the YMCA, Atlantic City, "is the greatest in the world!"

If you want a physique that will inspire respect from men, and admiration from women . . . ACT LIKE A HE-MAN! Decide at once! The famous book, "Nerves of Steel—Muscles Like Iron" will be included FREE! Priceless for the strength fan! Full of photos of marvelous power-bodied men who will show you what Jowett has done for them and how he can do the same for you. Reach out . . . Grasp this Special Offer today!

**PROVE TO YOURSELF IN ONE NIGHT!**

Send only 25c for test Course, "Molding a Mighty Arm." Read it the evening it arrives—learn from experience the thrill you can give your muscles!

**SEND FOR THESE FIVE FAMOUS COURSES IN BOOK FORM**

**ONLY 25c EACH or ALL 5 for $1.00**

Jowett Institute of Physical Culture
230 Fifth Avenue
Dept. PS-65
New York 1, N. Y.

*This Book Free!*

**BOOK WITH PHOTOS OF FAMOUS STRONG MEN**
**MAIL COUPON NOW** **FREE**

George F. Jowett
Champion of Champions

Jowett Institute of Physical Culture
230 Fifth Avenue, Dept. PS-65, New York 1, N. Y.

George F. Jowett: Your proposition looks good to me. Send by return mail, prepaid, the courses checked below, for which I enclose (  ). Include FREE book of PHOTOS.

- ☐ All 5 courses for . . . . $1
- ☐ Molding Mighty Legs 25c
- ☐ Molding a Mighty Arm 25c
- ☐ Molding a Mighty Grip 25c
- ☐ Molding a Mighty Back 25c
- ☐ Molding a Mighty Chest 25c
- ☐ Send all 5 C.O.D. ($1 plus postage.) No orders less than $1 sent C.O.D.

NAME.....Age.....
(Please print plainly. Include Zone Number.)

ADDRESS .....

# You'll Agree It Was Worth the Wait!

WEBSTER'S NEW INTERNATIONAL DICTIONARY
Second Edition
UNABRIDGED

*The* **Merriam-WEBSTER**

YOU may have had to wait for your copy of WEBSTER'S NEW INTERNATIONAL DICTIONARY, Second Edition. Now, however, more and more copies are reaching your dealer. See him today—he may have one for you or will get it soon.

The MERRIAM-Webster contains 3,350 pages, illustrations for 12,000 terms, and a total of 600,000 entries—122,000 more than any other dictionary. It is the only unabridged dictionary completely revised and rewritten in 25 years—the dictionary for today's needs. G. & C. MERRIAM COMPANY, Publishers, Springfield 2, Mass.

***"The Supreme Authority"***



# Do you want

**..to go to College?**

**..or to enter a Profession?**

*(Such as Accounting, Architecture, Nursing, Dentistry, Teaching, Social Work, Osteopathy, Beauty Culture, Optometry, Embalming, Chiropody, Law, Medicine, etc.)*

**..or get an Office Position?**

To get anywhere, you practically MUST finish High School FIRST. You can complete our simplified High School Course in SPARE time at home, as FAST as your time and abilities permit. Equivalent to resident school work—prepares you for college, pre-professional examinations, business, industry. Standard texts furnished. Diploma. Credit for H.S. subjects already completed. Single subjects if desired. Low tuition, easy terms. American School, Chicago, est. 1897—endorsed by educators. Finish your high school education NOW. Write TODAY!

**High School Course at Home** — **Many Finish in 2 Years**

**American School, Dept. H546, Drexel Ave. at 58th St., Chicago 37**

Gentlemen: Send me FREE information covering special training in subjects checked below. No obligation on my part.

- ☐ High School Course
- ☐ Electronics, Industrial
- ☐ Architecture and Building
- ☐ Automotive Engineering
- ☐ Business Management
- ☐ Electrical Engineering
- ☐ Elec. and Gas Refrigeration
- ☐ Air Conditioning
- ☐ Railway Training
- ☐ Diesel Engineering
- ☐ Drafting and Design for Men and Women
- ☐ Plastics
- ☐ Private Secretary
- ☐ Mechanical Engineering
- ☐ Aviation
- ☐ Salesmanship
- ☐ Radio

*Name*.....

*Address*.....




Copyrighted material

# *See* how readily YOU can train at home for BIGGER EARNINGS *in* RADIO ELECTRONICS

**FREE KIT PACKET SHOWS HOW YOU CAN GET LOTS OF "LEARN-BY-DOING" RADIO EXPERIENCE AT HOME FROM DeFOREST'S THRILLING RADIO *"Home Laboratory"***

Now—you can see for yourself why DeForest's Training does such a grand job of preparing men for a bright future in one of America's most promising opportunity fields—Radio and Electronics. Send the coupon below for your free *"Kit Packet"* plus the big free book, "Victory For You!" that has helped so many to good pay jobs. You'll be surprised at the opportunities ahead of FM Radio, Aviation Radio, Broadcast Radio, a profitable Business of Your Own, Motion Picture Sound Equipment, and Electronics—plus the exciting future possibilities ahead of Television, Radar, etc. You can train in your spare time at home—or you may get all of your training in our Chicago laboratories.

## 133 EXPERIMENTS

DeForest's Kit Packet shows how you can get real Radio experience from the many standard Radio parts furnished you with DeForest's Training. See how you may quickly build Radio Circuits that work . . . how you may experiment with Photo Electric Cell "Magic" . . . a 5-Tube Superheterodyne Receiver . . . a Radio Telephone and scores of other fascinating projects. See how you get actual **"shop training"** at home to give you the practical Radio experience you need.

## VETERANS!

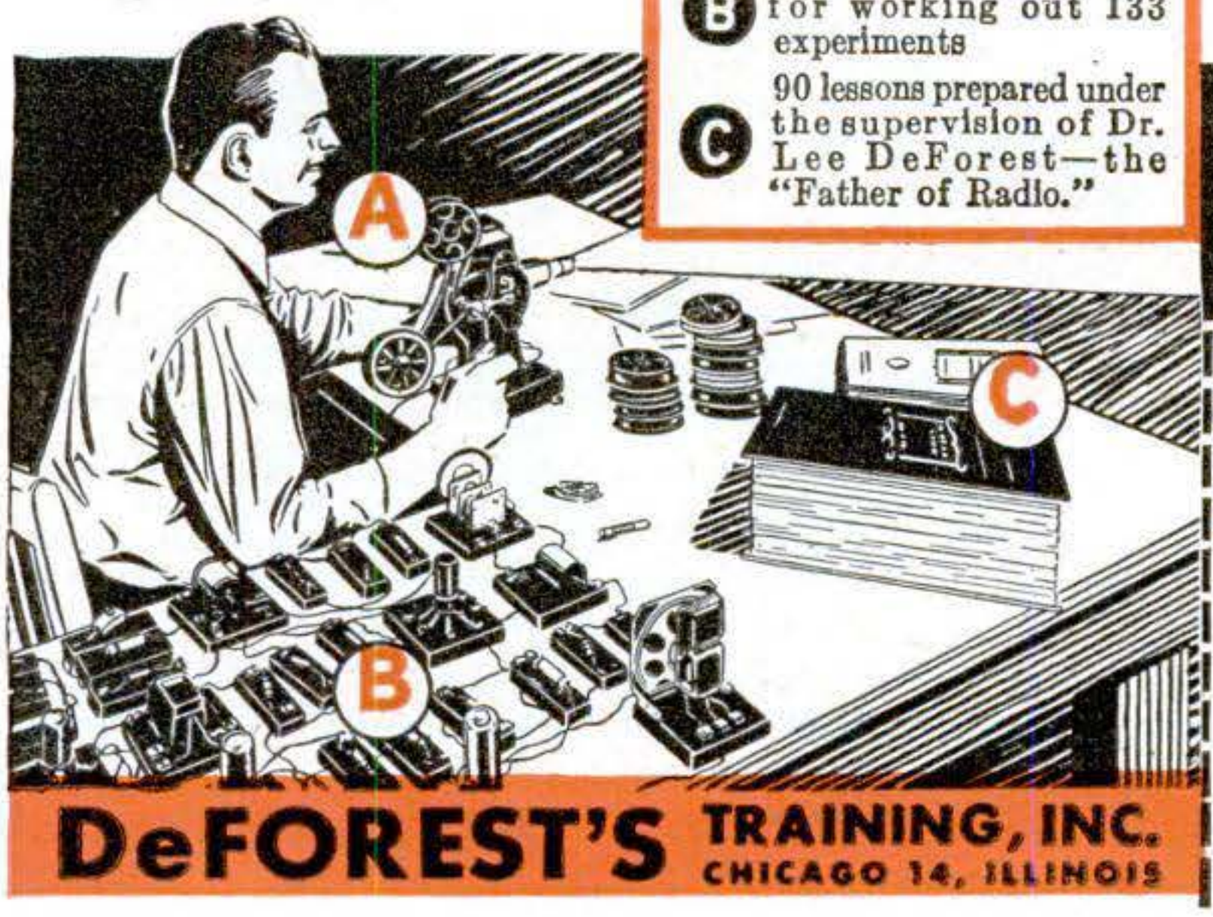
Big things are happening at De Forest's for veterans! See how you can prepare yourself **without cost** for a GOOD JOB or BUSINESS OF YOUR OWN in the vast Radio-Electronic opportunity field.

**DeFOREST'S PROVIDES ALL 3 HOME TRAINING AIDS**

- **A** DeVry Movie Projector and Learn-By-Seeing Movie Film
- **B** Actual Radio Parts for working out 133 experiments
- **C** 90 lessons prepared under the supervision of Dr. Lee DeForest—the "Father of Radio."

## You Also Get EFFECTIVE EMPLOYMENT SERVICE

Upon completing your training, you get the full benefit of DeForest's Employment Service that has helped so many men to get started in the Radio-Electronic field.




**DeFOREST'S TRAINING, INC.**
CHICAGO 14, ILLINOIS

**DEFOREST'S TRAINING INCLUDES INSTRUCTION IN MOTION PICTURE SOUND EQUIPMENT, FM RADIO AND TELEVISION . . . RESIDENTIAL TRAINING IN OUR MODERN CHICAGO LABORATORIES ALSO AVAILABLE —ASK US FOR INFORMATION!**

E. B. DeVry, President
DeFOREST'S TRAINING, INC.
2535-41 North Ashland Ave., Dept. PS-C5
Chicago 14, Illinois, U.S.A.

Send FREE RADIO KIT PACKET and "VICTORY FOR YOU!" BOOK.

*Name* _____ *Age* _____

*Address* _____ *Apt.* _____

*City* _____ *Zone* _____ *State* _____

☐ If under 16, check here for special information.

☐ If a discharged Veteran of World War II, check here.



Copyrighted material

HIGH PAY, PERMANENT JOBS AWAIT MEN WITH...

# DIESEL TRACTOR AND HEAVY EQUIPMENT TRAINING

**CAN YOU Qualify ?**

**ASSURE YOUR FUTURE!** Get set now for job and advancement opportunities in this high-pay field. Best jobs go to men with "know-how." I.T.S. home training qualifies you for better jobs.

## THOUSANDS OF JOB OPPORTUNITIES!

● In coming years no other field will offer more opportunities for ambitious trained men than heavy construction. Highways, dams, airports, factories will be built! Agriculture, transportation, industry, shipping will forge ahead! Wherever there is building and construction, diesels, tractors and heavy equipment will be used. Experts say thousands of new men will be needed to service, repair and operate this equipment. I.T.S. home training prepares you for these important jobs.

**VETERANS ATTENTION!**
I.T.S. Home Training can help you to BETTER JOBS!
Write for Special Folder

### Better Jobs go to Trained Men

I.T.S. home training can help you to better jobs in the Diesel, Tractor and Heavy Equipment field as it has hundreds of others. Higher pay and advancement are yours if you are qualified. Students say nothing has helped them get ahead as much as our practical, easy-to-understand course.

*Complete* UP-TO-THE-MINUTE HOME TRAINING COURSE NOW AVAILABLE If you are mechanically inclined or already working in the automotive, diesel, tractor or heavy equipment field you'll want to know all about I.T.S home training. Whether you are interested in operating, servicing or selling, a few hours study each week with this 52-week, completely modern course will give you a practical and valuable knowledge of all branches of diesel, tractor and heavy equipment. Easy to master while on your present job.

**FREE PLACEMENT SERVICE**

Qualified I.T.S. students receive free job placement service.

**TRAIN AT HOME! IN SPARE TIME**

**DON'T MISS THIS OPPORTUNITY**
Mail Coupon TODAY for Complete Information!

**INTERSTATE TRAINING SERVICE**

INTERSTATE TRAINING SERVICE
Weatherly Bldg., Portland 14, Oregon DEPT. PS-56
Please send full information about your Tractor, Diesel and Heavy Equipment Home Training Course.

Name _____

Address _____

City _____ Zone ____ State _____

# Parks Offers Information On How To Prepare For Your Career In Aviation

Write for Parks' 64-page illustrated catalog describing how to prepare for your opportunities in Aviation.

For the past 18 years Parks graduates in Aviation Maintenance, Operations, and Aeronautical Engineering have continued to assume positions of Leadership in the Industry.

Parks training is on the college level leading to the Bachelor of Science Degree.

You will find the answer to your questions on Aeronautical Career preparation by writing the College Registrar. He will send you, without charge, information of value to your future. Write today!

**PARKS AIR COLLEGE**
PS-56 • East St. Louis, Illinois

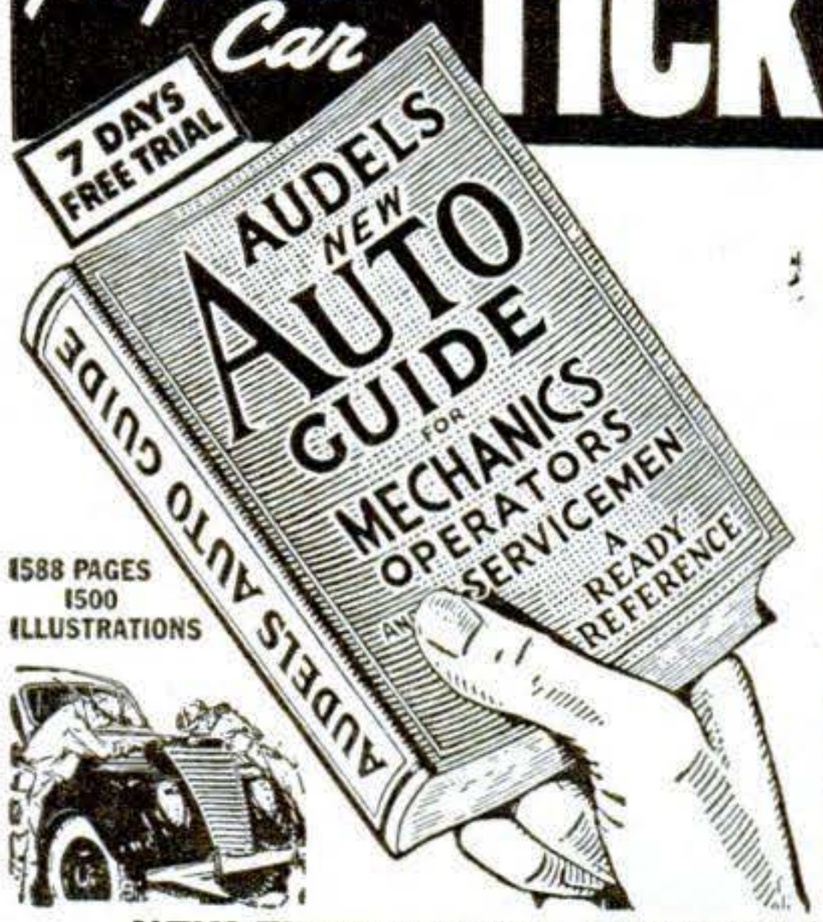
# LEARN MONEY-MAKING CARTOONING

**IN SPARE TIME — by Easy Picture Chart Method**
Same Simplified Method that has helped train creators of "Terry & Pirates," "Freckles," "Out Our Way," "Winnie Winkle," "Reg'lar Fellers," "Strange As It Seems," "The Neighbors," and many others. Earn while learning. Send 10c for Picture Chart (to test your ability). Samples of successful students, and full details. (State age.)

**Landon School of Cartooning, Dept. 4625, Philadelphia 1, Pa.**

# *Keep that Car* "TICKING"

**7 DAYS FREE TRIAL**




1588 PAGES 1500 ILLUSTRATIONS

Every operator and mechanic needs AUDELS AUTO GUIDE.

This book saves time, money and worry. Highly endorsed. It presents the whole subject of auto mechanics:

1—Basic principles
2—Construction
3—Operation
4—Service
5—Repair

Handy Size. Easily understood.

**NEW FLUID DRIVE, HYDRAULIC SHIFT AND DIESEL ENGINES FULLY COVERED**

Over 1500 pages—1540 illustrations showing inside views of modern cars, trucks and buses with instructions for all service jobs.

**$4 COMPLETE** ASK TO SEE IT!—To Get This Assistance for Yourself Simply Fill in and Mail Coupon Today.

**• PAY ONLY $1. A MONTH ←**

**AUDEL, Publishers, 49 West 23rd St., New York**
MAIL AUDELS NEW AUTO GUIDE for free examination. If O.K. I will send you $1 in 7 days; then remit $1 monthly until price of $4 is paid. Otherwise I will return it.

Name _____

Address _____

Occupation _____

Employed by _____ P.S.M.



Copyrighted material

# INTERNATIONAL CORRESPONDENCE SCHOOLS

## OFFER YOU LOW-COST SPECIAL TRAINING

### FOR SUCCESS IN MODERN BUSINESS AND INDUSTRY

**Air Conditioning and Plumbing Courses**

Air Conditioning
Heating Plumbing
Refrigeration
Steam Fitting

**Chemistry Courses**

Chemical Engineering
Chemistry, Analytical
Chemistry, Industrial
Chemistry, Mfg. Iron and Steel
Petroleum Refining
Plastics
Pulp and Paper Making

**Civil Engineering, Architectural and Mining Courses**

Architectural Drafting
Architecture
Bridge and Building Foreman
Building Estimating
Civil Engineering
Coal Mining
Contracting and Building
Highway Engineering
Lumber Dealer
Reading Structural Blueprints
Sanitary Engineering
Structural Drafting
Structural Engineering
Surveying and Mapping

**Communications Courses**

Electronics
Practical Telephony
Radio, General
Radio Operating
Radio Servicing
Telegraph Engineering

**Electrical Courses**

Electrical Drafting
Electrical Engineering
Electric Light and Power
Lighting Technician
Practical Electrician

**Internal Combustion Engines Courses**

Auto Technician
Aviation Diesel-Electric
Diesel Engines
Gas Engines

**Mechanical Courses**

Aeronautical Engineering
Aircraft Drafting
Flight Engineer
Foundry Work
Heat Treatment of Metals
Industrial Engineering
Industrial Metallurgy
Machine Shop
Mechanical Drafting
Mechanical Engineering
Mold-Loft Work
Patternmaking—Wood, Metal
Reading Shop Blueprints
Sheet-Metal Drafting
Sheet-Metal Worker
Ship Drafting
Ship Fitting
Tool Designing
Toolmaking
Welding—Gas and Electric

**Railroad Courses**

Air Brake
Car Inspector
Diesel Locomotive
Locomotive Engineer
Locomotive Fireman
Railroad Section Foreman

**Steam Engineering Courses**

Boilermaking
Combustion Engineering
Engine Running
Marine Engineering
Steam Electric
Steam Engines

**Textile Courses**

Cotton Manufacturing
Rayon Weaving
Textile Designing
Woolen Manufacturing

**Business and Academic Courses**

Accounting Advertising
Arithmetic Bookkeeping
Business Correspondence
Business Management
Certified Public Accounting
Commercial
Cost Accounting
Federal Tax
First Year College
Foremanship French
Good English
High School
Higher Mathematics
Illustrating
Motor Traffic
Postal Service
Salesmanship
Secretarial
Sign Lettering
Spanish Stenography
Traffic Management

**If you can read and write, and are willing to study,**

**WE CAN TEACH YOU!**

- ***Special service and attention are always given to the student who may need extra help in order to understand.***

**REASONABLE TERMS MAY BE ARRANGED**

**The successful man DOES today what the failure INTENDS to do tomorrow. Mail this coupon NOW!**

**INTERNATIONAL CORRESPONDENCE SCHOOLS**
**BOX 7658-L, SCRANTON 9, PENNA.**

Please send complete information on following subject:

_____

*(Write above Technical, Business or General Educational Subject in which you are interested.)*

Name _____ Age _____

Home Address _____

City _____ State _____

Present Position _____ Working Hours _____ A.M. _____ P.M.

Check here if Veteran of World War II _____



Copyrighted material

# Evans Helps INVENTORS

For nearly 50 years the Victor J. Evans' Staff of Registered Patent Attorneys, searchers, draftsmen and specification writers have helped thousands of inventors secure patents. They can help you! All you need do NOW is take . . .

## THE FIRST IMPORTANT STEP..

### SEND FOR THESE FREE BOOKS!

They are full of valuable information. They tell you the steps you must take to secure a Patent . . . types of Patents . . . how Inventions are developed . . . financing a Patent. They show 115 fundamental mechanical movements that may help you complete your invention. DON'T WAIT 'TILL TOMORROW—Send the coupon for these FREE BOOKS TODAY—so you can learn the procedures that are required by the United States Patent Office . . . so that you can secure protection as soon as possible.

## PATENTS WANTED BY INDUSTRY

## Now...

Nationally known manufacturers are looking for new items to make and sell. They are looking for devices or improvements in machines and processes that will help them turn out more products faster and cheaper. Housewives, automobile owners, boat owners, men and women in all walks of life will be ready buyers for items that inventors like you will provide.

### IT'S UP TO YOU!

Are you going to wait and let someone beat you to it—OR WILL YOU ACT NOW AND BE GLAD YOU ACTED?

## VICTOR J. EVANS & Co.

**Patents—Trade Marks—Copyrights for Nearly 50 Years**
**140-E Merlin Building, Washington 6, D. C.**

Please send me your books—"Patent Protection" and "When and How to Sell Your Invention"—also important "Evidence of Invention" form, without cost or obligation.

Name . . . . . .

Address . . . . . .

City and State . . . . . .

*MAIL THIS TODAY*

# Get into Good Paying AUTO BODY and FENDER WORK

**WRITE FOR FACTS**

Men 18 to 60. If you are mechanically inclined, start now to learn to become an auto body mechanic and fender repair man. U. E. I. spare time, home-study training combined with actual shop practice gives you sound, basic knowledge of practical methods so you may get the experience which may bring you big pay. Course includes acetylene welding, spray painting, use of hand and power tools.

### THOROUGH, RELIABLE TRAINING

Auto body and fender repairing is one of the best profit-makers in any garage or service station. Employment placement service included, or we'll show you how to go about to get started in your own shop. Get the facts FREE today!

AUTO-CRAFTS DIVISION • **UTILITIES ENGINEERING INSTITUTE**
**1314 BELDEN AVENUE, DEPT. 356X, CHICAGO 14, ILLINOIS**

# TRI-STATE COLLEGE

## B. S. Degree in 27 Months

Distinguished for technical 2¼-year courses in Civil, Electrical, Mechanical, Chemical, Radio, Aeronautical Engineering; Business Administration, Accounting, and Secretarial Science. VETERANS can complete work here in shortest possible time. Cosmopolitan student body. 63rd year. Enter June, Sept., Jan., March. School now filled to capacity. No applications can be accepted until further notice.

**546 College Ave.** **ANGOLA, INDIANA**

# THERE'S MONEY IN CARTOONS!

RAYE BURNS will teach you HOW to CREATE ORIGINAL CARTOONS **at home** that you may SELL! Course contains **26 lessons** and **over 600 illustrations.** All for *Only* . . **$2.85**

*Send name and address for free details.*

**RAYE BURNS SCHOOL, Dept. S, Box 3583, CLEVELAND, OHIO**

# AVIATION Career

## MAXIMUM TRAINING IN MINIMUM TIME

CAL-AERO TECH TRAINING will add dollars to your pay check all the rest of your life. Specializing in AERONAUTICAL ENGINEERING and MASTER AVIATION MECHANICS since 1929, Cal-Aero Tech training is carefully designed for just one thing—TO MAKE MORE MONEY FOR YOU. An alumni of over 6000 successful graduates proves our career training is unsurpassed.

**VETERANS** —Write us about Aviation Training, as provided under "G.I. Bill of Rights."

**CAL-AERO TECHNICAL INSTITUTE**
MAJOR C. C. MOSELEY PRES. SINCE 1929
FORMERLY CURTISS-WRIGHT TECHNICAL INSTITUTE

**GRAND CENTRAL AIR TERMINAL**
**GLENDALE 1, CALIFORNIA**
LOS ANGELES COUNTY

## MAIL THIS COUPON TODAY!

Cal-Aero Technical Institute, Grand Central Airport, Glendale 1, California
Please send full information on Aviation Training FREE—without obligation. Dept PS-5

Name _____ Birth Date _____

Street _____

City _____ State _____



Copyrighted material

# WHICH OF THESE *Opportunities* INTERESTS *You* MOST?

Accounting & C. P. A.
Air Conditioning
Architecture & Building
Automotive Engineering
Aviation—Practical
Aviation Drafting & Design
Better Foremanship
Bookkeeping
Business Management
Contracting
Diesel Engineering
Drafting & Design
Electrical Engineering
Electricity—Practical
Electronics, Industrial
High School Courses
Machine Shop Operations
Mechanical Engineering
Plastics Engineering
Plumbing—Practical
Private Secretary
Radio Operating & Servicing
Railway Training
Refrigeration
Sheet Metal Pattern Drafting
Shop Management
Surveying & Topographical Drafting
Tool Making

## THINK! LOOK FORWARD!

## Business is making big, new plans
## Men and Women are preparing for the future
## WHAT ARE YOU DOING ABOUT *YOUR* TOMORROWS?

● *Today,* choose the job you want—and prepare for it. Or if you are already engaged in the work you like best, start training *now* for quicker promotion. Acquire the knowledge that will help you to get ahead faster, make more money and have greater security.

Invest part of your spare time in more rapid progress. Start training now, in spare time in your own home. Be ready to grasp your opportunity and step out ahead of those who lack the ability you have attained.

American School, founded in 1897 as an educational institution *not for profit,* can help you to reach your goal just as it has helped others during the past forty-nine years. Give serious thought to the list above. Pick one or more subjects that interest you. Then check the coupon at right, add your name and address and mail it at once. The school will send you details on its training plan and outline of study prepared by specialists. There is no charge, no obligation, so send the coupon immediately.

PRACTICAL, EFFECTIVE HOME - STUDY TRAINING SINCE 1897

**Take This First Easy Step**

**CHECK, CLIP AND MAIL COUPON NOW**

**AMERICAN SCHOOL, Dept. G546, Drexel at 58th, Chicago 37, Ill.**
*Without obligation,* Please send FREE and postpaid, bulletin and details of the Subject checked.

- ☐ PLASTICS ENG'R
- ☐ Refrigeration
- ☐ Architecture and Building
- ☐ Contracting
- ☐ Practical Plumbing
- ☐ Automotive Engineering
- ☐ Aviation Drafting
- ☐ Aviation
- ☐ Business Mgnment
- ☐ Railway Training
- ☐ Accounting & C.P.A.
- ☐ Electrical Engr.
- ☐ Electricity-Pract.
- ☐ Electronics, Industr.
- ☐ Bookkeeping
- ☐ Private Secretary
- ☐ Diesel Engineering
- ☐ Surveying & Topographical Drafting
- ☐ Sheet Metal Pattern Drafting
- ☐ Drafting and Design for Men and Women
- ☐ Radio
- ☐ High School
- ☐ Air Conditioning
- ☐ Mechanical Eng.
- ☐ Shop Management
- ☐ Tool Making
- ☐ Better Foremanship
- ☐ Machine Shop Operations

*Name*.....*Occupation*.....
*Address*.....*Age*.....
*City*.....*State*.....

**AMERICAN SCHOOL**
**Dept. G546, Drexel at 58th Street, Chicago 37**



Copyrighted material

**$1,506 to $2,650 Year to Start**

**Veterans Get Preference!**

## GET READY NOW FOR 1946 EXAMINATIONS

### Railway Postal Clerks

Railway Postal Clerks get $1,900 the first year regular, being paid on the first and fifteenth of each month. ($79.17 each pay day.) Their pay is automatically increased yearly to $3,000. Advance may be had to Chief Clerk at $5,000 a year. ($208.33 each pay day.) Age 18 to 35.

**Travel for "Uncle Sam"**

### 3 Days On — 3 Days Off — Full Pay

Railway Postal Clerks on long runs usually work 3 days and have 3 days off duty or in the same proportion. During this off duty their pay continues just as though they were working. They travel on a pass when on business. When they grow old, they are retired with a pension.

### City Mail Carriers, Post Office Clerks

Clerks and Carriers now get $1,700 ($141.67 a month) the first year on regular and automatically increase $100 a year to $2,700 ($225.00 a month) and $3,000. Age 18 to 48.

### Ass't Statistical Clerk

Open to Men—Women 18 to 50. Entrance salary $1,902 year. Appointments as Clerks in the Departments at Washington, D. C., are made from this examination.

### Many Other Positions

Many other positions are obtainable. Those wishing these positions should qualify at once.

### Get Free List of Positions

Fill out the following coupon. Tear it off and mail it today—now, at once.

This small investment can result in your getting a big-paid government job.

**FRANKLIN INSTITUTE, Dept. R81, Rochester 4, N. Y.**

Rush to me, entirely free of charge (1) a full description of U. S. Government Jobs; (2) Free copy of illustrated 32-page book, "How To Get A U. S. Government Job"; (3) List of U. S. Government Jobs; (4) Tell me what to do to prepare for one of these.

Name.....

Address.....Vet?.....

**Use This Coupon Before You Mislay it. Write or Print Plainly.**

## LET US TEACH YOU TO Mount Birds

**Animals, Fish, Heads; to TAN.**

**Hunters, Trappers,** be a **Taxidermist.** Let this old reliable school teach **you—at home, in spare time.** Our school has over 300,000 students. Save your fine trophies. Mount and keep **ducks, deer, ALL** wild-game. Tan skins, make robes and rugs, **double** your interest in **HUNTING AND FISHING.** Have a **home** museum.

**Free Book** Yes, **FREE,** this great **strange** book, with 100 fine wild-game pictures. Tells how **YOU** can become a real **TAXIDERMIST,** easily and quickly. It is amazing, thrilling, and may bring **you** a lifetime of **PLEASURE and PROFIT. SPORTSMEN,** grasp this opportunity. **SEND NOW.** A **postal** will do. But **WRITE TODAY**—don't fail. State your **age.**

**N. W. SCHOOL OF TAXIDERMY**
**3395 ELWOOD BLDG., OMAHA 2, NEBR.**

## NEW WRITERS NEEDED

New writers needed to re-write ideas in newspapers, magazines and books. Splendid opportunity to "break-into" fascinating writing field. May bring you up to $5.00 per hour spare time. Experience unnecessary. Write today for FREE details NO OBLIGATION. Postcard will do.

**FREE DETAILS**

**COMFORT WRITER'S SERVICE**
**200-T41 South Seventh (2) St. Louis, Mo.**

## LAW

STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 37 years expert instruction—over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy payments. Send for FREE BOOK—"Law and Executive Guidance"

**AMERICAN EXTENSION SCHOOL OF LAW**
**Dept. 65-S. 646 N. Michigan Ave., Chicago 11, Ill.**

## Learn How to Repair ELECTRICAL APPLIANCES

Nearly 3,000,000 additional American homes have been wired for electricity since 1940 . . . making the opportunity and demand for service mechanics in this field the greatest in history. Our practical, easy-to-learn home course teaches you, during your spare time, how to repair washing machines, vacuum cleaners, stoves, lamps, motors, irons, etc., and to do house wiring. Learn how to—

### OPEN YOUR OWN REPAIR SHOP

***Have a Secure Permanent Future***

**WITH A BUSINESS OF YOUR OWN**

You won't lose your job if another big depression comes along when you have your own shop. You can start a business of your own in your garage or basement with $20.00 worth of tools. One good repair job can pay for the cost of the entire course. Write today for further information, without obligation.

**USE COUPON BELOW**

**SEND FOR FREE BOOKLET TODAY!**

**Pacific Training School**
**7217 So. Broadway, Dept. S-5, Los Angeles 3, Calif.**

**Dear Sirs: Please send me, without obligation, your free catalog and full details.**

*Name* .....

*Address* .....

*City*..... *State*.....

Copyrighted material

# GET INTO RADIO

## TELEVISION ELECTRONICS NOW!

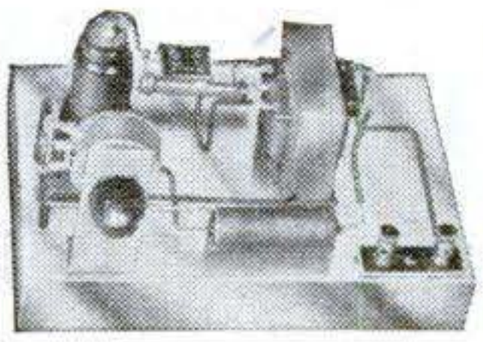
This amazing new shop instruction system gives you actual experience with a Home Radio Laboratory—part of the

You build this complete, modern superheterodyne receiver with the equipment that comes with your National Training at no extra cost.

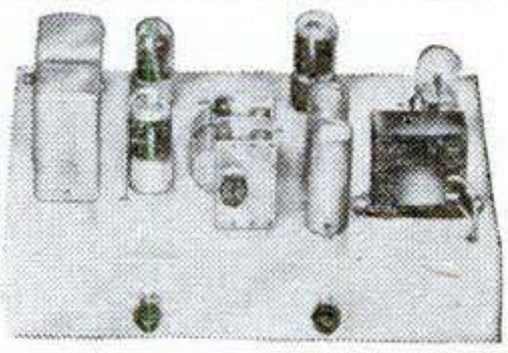
# SHOP METHOD HOME TRAINING

## FOR YOU—A REAL HOME LABORATORY IN MODERN RADIO

## from one of the world's best established Oldest and Largest Technical Trade School

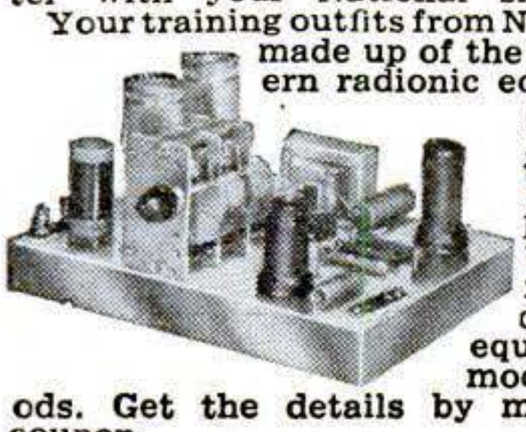


Your National Training Kits include equipment for hundreds of practical electronic experiments in your own home. You have the genuine parts for this audio oscillator which you get to understand by building it yourself.



You learn modulation, beat frequencies, signal generation by actually building this small radio transmitter with your National shop parts.

Your training outfits from National are made up of the most modern radionic equipment—much of it just out of the experimental laboratory. You learn new ways of handling equipment by modern methods. Get the details by mailing the coupon.



Send the coupon below, immediately. Learn how this **sensationally improved,** practical speed-up training can fit you, in a short time, for the GREAT BUSINESS OF RADIO—for the NEW AND RAPIDLY EXPANDING FIELD OF FREQUENCY MODULATION (F.M.), TELEVISION AND ELECTRONICS.

This is the thoroughly proved, quick and easy speed-up method used so extensively in wartime training—endorsed by **the success of National men everywhere**—a system by which you study in spare time—off hours, even minutes right in your home and yet have the ADVANTAGE OF REAL SHOP EXPERIENCE to back you up.

### Trained Radio Men Wanted

The man who really **knows modern Radio** is in greater demand today than ever before—not only in Radio proper but in Television and Electronics—in Aviation, Transportation, Communications. **Good jobs are wide open,** WAITING FOR YOU, in the production, operation and maintenance of modern electronic equipment—in radio stations, in hundreds of industries—in homes, theatres and studios. Good, sound training in this important field is absolutely necessary. And now, National Schools brings such training to you **no matter where you live or what you may be doing**—not only the fundamental theory but **the actual experience that comes with knowing shop practice and working with real equipment**—demonstrating each step with first-hand knowledge. This is true **"learning by doing"**—direct from the great shops and laboratories of National Schools where new developments in methods, equipment and applications are constantly going forward.

Only National can offer you such practical training because only National has the plant to back it up. **Sample this training** yourself. MAIL THE COUPON FOR A FREE LESSON.

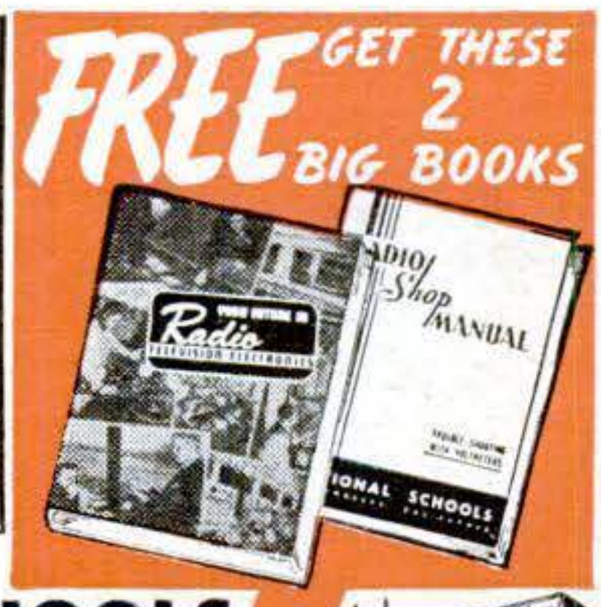
### POSTWAR SUCCESS and SECURITY FOR YOU

Radio is a Big Sound, Well-Established Business. **Television is just on the threshold of limitless expansion.** When you hang up your uniform—when your war job folds up, will you step out proudly into an essential established industry? Perhaps into a business of your own? Answer these questions by reading the catalog sent you FREE from National Schools. **Face realities now!** Fill out and mail the coupon today.

### Check the Job You Now Have With These Opportunities in RADIO

1. **Financial Security** Radio has grown from $100 million to $5 billion in past few years.
2. **Limitless Future** predicted by over 1,800 manufacturers of equipment.
3. **Television promises** over half a million jobs alone—experts estimate.
4. **Electronics opens** wide new fields in home and industrial use.
5. **Your Own Business** with little or no capital.

**Get the details. Use this Coupon!**




## NATIONAL TRAINING WINS BIG JOBS

You, too, can share the success of National graduates. Joseph Grumich, Lake Hiawatha, N. J. writes: "My latest offer was for $5,800.00 as Radio Photo Engineer, but I am doing well where I am. I am deeply indebted to National."

While still a student of National training, I. Wilson of Vallejo, California, writes: "My pay has jumped from $52.18 a week to $72.65, and the end is not in sight. I am proud of my National Course."

Joseph Michel, Jr., Granite City, Illinois, writes: "I am enthused with National training. I am now earning $225 a month as a radio operator and technician and $20 a week more in my shop at home."

## NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA EST 1905

**MAIL OPPORTUNITY COUPON FOR QUICK ACTION**

**National Schools, Dept. PS-5**
**4000 South Figueroa Street**
**Los Angeles 37, California**

*(Mail in envelope or paste on penny post card)*

Mail me FREE the books mentioned in your ad including a sample lesson of your course. I understand no salesman will call on me.

NAME.....AGE.....

ADDRESS.....

CITY.....STATE.....
Include your zone number



Copyrighted material

# The set of books that makes MASTER MACHINISTS

## *and leads to bigger pay!*

This big home-study and reference course gives you the practical facts on machines and methods you need to advance in machine shop work. Take advantage of the other man's experience as found in books, to solve your problems, increase your efficiency, with

## The AMERICAN MACHINISTS' LIBRARY

**6 volumes—2368 pages—2516 illustrations**
**(A combined home-study course and reference library)**

This library of machine shop practice was written for practical men. It gives you the best methods for every kind of machine shop work. It fully explains lathes, drills, and other machine tools and their operation, automatic screw machines, speeds and feeds, gear design and production, jigs and fixtures, punch and die work, metal surfacing, etc., etc. Plainly written—completely illustrated—the best kind of help to the machine shop man who wants to advance himself.

**No money down—special price—easy payments.**

*EXAMINATION COUPON*

**McGRAW-HILL BOOK CO., 330 W. 42nd St., N. Y. C. 18**

Send me for ten days' examination the American Machinists' Library. If satisfactory I will send you $1.50 in 10 days and $3.00 monthly until the price of $19.50 is paid. If not wanted, I will return the books postpaid. **(To insure prompt shipment write plainly and fill in all lines.)**

Name.....

Home Address.....

City and State.....

Company.....

Position..... PSM, 5-46

# BE A WATCHMAKER

## Enjoy Security and a Good Income in this Skilled Profession

There is a nation-wide demand for skilled watchmakers! You can prepare for a successful career by training at American Schools of Watchmaking. In this respected field you enjoy clean, light work in jewelry stores—many watchmakers establish businesses of their own. Millions of timepieces require frequent service—there is always a need for skilled men to handle these delicate instruments. American Schools of Watchmaking offer a fully accredited course, taught by experienced watchmakers, with all equipment necessary to learn every phase of this profession.

**VETERANS! SERVICEMEN!**
Courses approved for Veterans Training under G. I. Bill.

Now is the time to come to Los Angeles to prepare for a well-paid, permanent career as a watchmaker. Write for complete, illustrated booklet on this interesting field, and A.S.W. training.

**AMERICAN SCHOOLS OF WATCHMAKING**
**Division of American School of Aircraft Instruments**
**5247 W. San Fernando Rd., Los Angeles 26, Calif., Dept. S-17**

**AMERICAN SCHOOLS OF WATCHMAKING**
**5247 W. San Fernando Rd., Los Angeles 26, Calif., Dept. S-17**

Gentlemen:
Please send me your illustrated booklet and complete information on the accredited A.S.W. Course in Watchmaking.

Name_____ Age_____

Address_____

City_____ Zone_____ State_____

Check one— ☐ Veteran ☐ In Service ☐ Civilian

**BECOME A SERVICE EXPERT**

# REFRIGERATION and AIR CONDITIONING

**Millions of Older Units Need Expert Service. Big After-the-War Expansion Will Create Even More Opportunities**

**Approved for Veterans "G. I." Training**

Now, not "next week," is the time to start training for a top-pay job in this vital field. A drastic shortage of trained service experts exists. Many thousands more will be needed for big post-war expansion caused by new industrial uses. Train NOW to get your pick of best jobs. We will give you the practical training you need. For 2 years we trained men and women for the Army and Navy only, in fine-precision aircraft instrument work. So our methods must be right. Common schooling is all you need. Our unique system makes everything easy to grasp. You can train at home and in our big Chicago shops. Write for full facts TODAY, without obligation.

**INDUSTRIAL TRAINING INSTITUTE**
**2150 Lawrence Avenue, Dept. P2R, Chicago 25, Illinois**

# NEW! TELEVISION

## made easy by this book

**TELEVISION SIMPLIFIED**
*by Milton S. Kiver*
Assoc. Instructor in Radio, U. S. Army Air Forces

Amazing how simple television becomes with this new handbook. Contains all information needed for success in television. Also covers trouble shooting and repair of radio sets. Fit yourself for this coming field. Send for this book today. $4.75 postpaid. Or ask for FREE EXAMINATION.

**D. VAN NOSTRAND COMPANY, INC.**
**250 Fourth Avenue New York 3, N. Y.**

*Good Handwriting*
HELPS YOU WIN SUCCESS!

It's so important to write a good hand for business and social advancement. Poor illegible penmanship often causes costly errors and marks you for failure. Why write a poor hand? It's so easy to learn at home in spare time. Write for our new free booklet today. If you wish, send 10c for a penpoint suitable for shaded writing and your name beautifully written.

*In Business Since 1895*
**THE TAMBLYN SCHOOL OF PENMANSHIP**
**H-439 Ridge Bldg., Kansas City, Mo., U.S.A.**

# IT'S REALLY FUN

## LEARNING MUSIC WITHOUT A TEACHER

## *—this easy way*

**Learned Quickly at Home**
"I learned more music in a few months than I hoped to in two years. Your lessons are practical." *W. S., Johnson City, Ill.

**Well Worth It**
"The money I spent on the course is well worth it. I do not know how the school can put out a course for so small a fee." *I.S. Heron Bay, Ontario, Canada.

OVER 750,000 students have enrolled for this home study method. Many didn't know one note from another—yet they started in learning simple tunes by note. For this wonderful method makes it easy as A-B-C to learn music at home, without expensive private lessons. No tedious study and practice. Every step is right before your eyes in print and pictures. You can't go wrong. Soon you are actually playing popular pieces on your favorite instrument.

**FREE Print and Picture Sample**

See how easily you may learn to play your favorite instrument in spare time at home at amazingly low cost. Mail coupon today. Address: U. S. School of Music, 85 Brunswick Bldg., New York 10, New York.

**SUCCESSFUL 48TH YR.**

**U. S. School of Music, 85 Brunswick Bldg., New York 10, N. Y.**

Please send me FREE Print and Picture Sample and Illustrated Booklet. I am interested in the instrument checked below.

| | | |
|---|---|---|
| Piano | Piano Accordion | Tenor Banjo |
| Guitar | Saxophone | Modern Elementary Harmony |
| Violin | Trumpet, Cornet | Other Instrument |

Name.....
(Please Print)

Street.....

City.....State.....

**Actual pupils' names on request. Pictures by professional models.*



Copyrighted material

# Need EXTRA MONEY? *My Books can help You-*

## *Try 'em in Your Home-* 7 Days FREE!

### Trouble Shooter

**GIANT SIZE**
**610 Pages**
**8½ x 11 in.**

**500 Full Size Diagrams Radio Circuits – Repairs – Motors and Armatures – DC, AC Automotive – Refrigeration.**

Actually 4 great books in one! Latest trouble-shooting methods — 500 large clear shop prints & wiring diagrams—big Electrical & Radio Dictionary—Spare-Time Job Manual. Pays for itself quick. Price $8.00 Cash or $8.95 on time, payable $3 in 7 days, then $3 per month.

### ELECTRICIANS' HANDBOOK

**POCKET SIZE**
**400 Pages**
**4 x 7½ in.**

**Latest electrical rules, codes, methods — Shop Hints — Short-cuts.**

This book is a "must" for the practical electrician. Saves time and guesswork on wiring, motors, power plants, batteries, illumination. PACKED WITH FACTS. Handsome binding. Price $2.75.

### ELECTRONICS

**EASY PRACTICAL**
**400 Pages**
**6 x 9 in.**

**How to Install, Operate, Test, Shoot Trouble on Electronic Controls of all Kinds.**

The **simplified** book on Electronics, field of the future! For Radio Men, Electricians and all interested in Practical Electronics. Hundreds of illustrations. Includes thyratron, pliotron, kenotron, ignitron, phototubes and others. Price $4.95.

### 150 Shop Prints

**& How to Read Them, 156 p., 8½ x 11 in.**

**Wiring Circuits – Motor Diagrams – Radio – D.C. and A.C.**

Good practical printsareworth 10c to 25c per print. Here are 150 in a handy bound book, with instructions on how to read and use them—all for only $1.95.

### Vest Pocket Data Book

and Radio-Electrical Dictionary BRAND NEW – Nothing Like It! Over 300 p., 3300 Electrical, Radio, Radar and ATOMIC Energy terms, 3" x 6", vest pocket size Leatherette binding. Price $1.50.

### EXTRA! I'll Give You This New Book FREE
**—just for asking to see $10 Worth of Above Books**

"Starting a Profitable Radio-Electric Shop"—over 200 pages, 5½ x 8", on how to go in business for yourself, choosing a location, getting orders, etc. If your total order herewith totals $10 or more, I'll send this amazing new book AS MY GIFT. You can keep it whether you purchase any of the other books or not!—ACT NOW TO GET GIFT BOOK FREE.

## On the Job or in Your Own Shop
## PRACTICAL KNOWLEDGE PAYS OFF!

Men, it's really easy to get that extra money you want! TO EARN MORE, YOU MUST BE WORTH MORE! Make yourself worth more with my practical, shop-tested books. Backed by 47 years' experience helping fellows get ahead in ELECTRICITY and RADIO.

Pick out the pay-raising, money-making books you'd like to see. I'll ship 'em postpaid for 7 DAY FREE TRIAL. Decide now to get the knowledge you need. Mail the coupon!

## SEND NO MONEY

I don't ask a penny until you've had the book or books you select, for 7 DAYS FREE. If not delighted, return them at my expense and you owe nothing. If you keep them, pay the low cost shown below. Don't delay! See these great books NOW.

**H. C. LEWIS, Pres.**

**COYNE ELECTRICAL SCHOOL**
**500 S. Paulina St., Dept. 56-R8**
**CHICAGO 12, ILL.**

### FREE TRIAL & GIFT BOOK COUPON

**H. C. LEWIS, Pres., COYNE ELECTRICAL SCHOOL**
**500 S. Paulina St., Dept. 56-R8, Chicago 12, Ill.**

Send postpaid, the book or books checked below for 7 DAYS FREE TRIAL. In 7 days I'll either return them and owe nothing, or pay as indicated.

☐ **Trouble Shooting Manual**
- ☐ Cash Price $8.00
- ☐ $8.95 on time—$3 in 7 days and $3 per mo.

☐ Electronics.....$4.95

☐ Elec. Handbook...$2.75
☐ 150 Shop Prints.. 1.95
☐ Data Book..... 1.50
☐ If order totals $10 or more, I'll pay $3 in 7 days, then $3 per month.

☐ If total order exceeds $10.00, send me FREE your new book, "Starting and Operating a Profitable Radio-Electric Shop" which is MINE TO KEEP whether I keep books ordered or not.

NAME.....AGE.....

ADDRESS.....

CITY.....ZONE.....STATE.....

☐ CHECK HERE if you want books sent C.O.D. You pay postman Cash Price shown above Same 7 day examination and MONEY-BACK Guarantee.



Copyrighted material

# SO IT NEEDS FIXING

**By S. T. CHRISTENSEN**

*the "Fix-it Man"*

"WELL, I guess I'm the fellow to see, for I've repaired thousands of refrigerators (home and commercial both), vacuum cleaners, radios, washing machines, irons, fans, lamps, mangles, motors, etc. In fact, many of my customers call me their "electrical appliance doctor." And "doctoring," I might add has paid me a good substantial income for quite a few years. Funny, in a way, how I got started. Always liked to tinker and by experimenting around I found that most electrical appliances had many things in common. That, regardless of what the appliance was used for, or who the manufacturer was, the basic principles were much the same. From fixing my own appliances to fixing friends' and then for strangers at a fee, seems now to have been but a small step.

### What to Charge?

At first, I let the owner decide the charge and, frankly, I was amazed at what I earned per hour. But then, when one figures what initial costs are involved in buying most electrical appliances, one can readily see that spending extra dollars for repairs is well worth while. Before long I was making more in my spare time repairing than from my regular job. The result . . . I went into business for myself. When war came, business boomed, for new appliances were not available.

For a while, repair parts (needed on some jobs) were a little difficult to get. But that situation quickly adjusted itself and many repair parts were given the high priority rating of AA2. After all, we had to provide for the health and well-being of our civilian population.

### The Future Offers

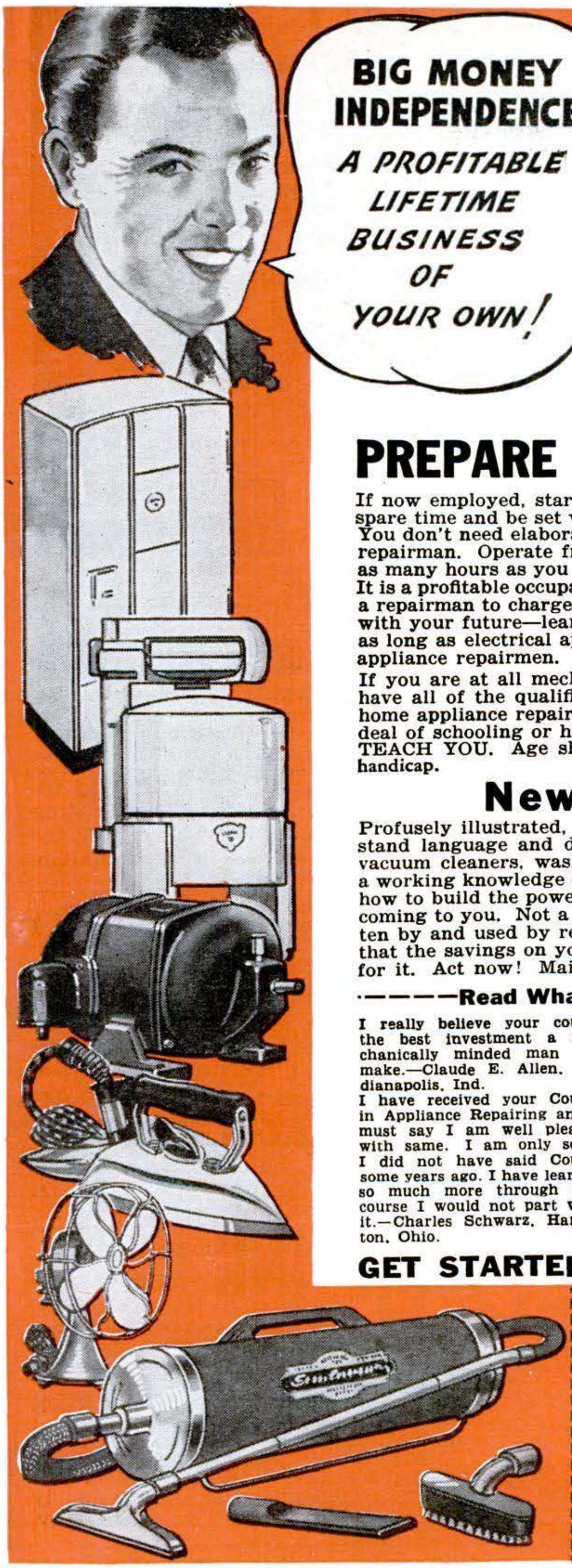
Friends ask me about my future. And, I think I've got a grand one. Age is no handicap in repairing. I have in my files enthusiastic letters from repairmen ranging in age from 18 to 79 years. Now the war is over we are certain to see hundreds of new products on the market . . . products that the average person never dreamt of. These new products and our old appliances are all going to need at some time or other "fixing." Well, I'll still be the fellow to do it. The field open for appliance repairmen is unlimited. I don't worry at all about too much competition.

### If You Are Ambitious

To the contrary, I've prepared a complete course, chuck full of simple, easy to understand photos and drawings and written in the same non-technical language as this article. I know the course is good, because I have hundreds of men all over the country writing to me telling me how the course has helped swell their pockets with cash. If you too want to prepare now for your future, I suggest you read the next page and send me the handy coupon." ADV.



Copyrighted material



**BIG MONEY INDEPENDENCE**

*A PROFITABLE LIFETIME BUSINESS OF YOUR OWN!*

# LEARN ELECTRICAL APPLIANCE REPAIRING

## PREPARE NOW FOR THE FUTURE

If now employed, start your home appliance repair business NOW in your spare time and be set with a business of your own no matter what happens. You don't need elaborate fixtures or expensive equipment to be a successful repairman. Operate from your garage, basement, vacant store, etc. Work as many hours as you wish—the home appliance repairman is his own boss. It is a profitable occupation for on many types of repairs it is not unusual for a repairman to charge on the basis of $5.00 to $6.00 per hour. Don't gamble with your future—learn a trade that will always support you. Remember, as long as electrical appliances are used, there will be a need for electrical appliance repairmen.

If you are at all mechanically inclined—can hold and use tools—then you have all of the qualifications required for becoming a big money earning home appliance repairman. It does not matter if you have not had a great deal of schooling or had previous experience along these lines—WE WILL TEACH YOU. Age should be no barrier—nor should any minor physical handicap.

## New Course Tells All

Profusely illustrated, our new course shows you in simple, easy to understand language and drawings how to make each repair on refrigerators, vacuum cleaners, washing machines, motors, etc. Explains and gives you a working knowledge of electricity, welding, nickel plating, etc. Shows you how to build the power tools you need and how to solicit and keep business coming to you. Not a theory course but an honest to goodness course written by and used by repairmen the country over. Price of course is so low that the savings on your own household appliance repairs will quickly pay for it. Act now! Mail the handy coupon below today.

### Read What Our Students Say About Course

I really believe your course the best investment a mechanically minded man can make.—Claude E. Allen, Indianapolis, Ind.

I have received your Course in Appliance Repairing and I must say I am well pleased with same. I am only sorry I did not have said Course some years ago. I have learned so much more through this course I would not part with it.—Charles Schwarz, Hamilton, Ohio.

The Course in Appliance Servicing arrived a few days ago. Want to take out a few minutes of my valuable time to let you know that this is just what I have been looking for ever since I opened up my Fix-It shop. I must admit that you told the truth when you said that it contains quite a bit more information than I bargained for. — P. J. Bretl, Sebring, Ohio.

I am a mechanic for the Western Union Telegraph Co. Three days after receiving the lessons in refrigeration I earned the exact cost of the course. —Henry S. Lee, Washington, D. C.

I work day times at the shipyard and after 4:00 P.M. I operate from my cellar and garage. I average $10.00 to $15.00 clear every day.—Walter Hanby, Brockton, Mass.

## GET STARTED TODAY — MAIL THIS COUPON

**CHRISTY SUPPLY CO.**
**2835 N. Central Ave., Dept. D-4001**
**Chicago 34, Illinois**

Please send me free illustrated literature about America's Fastest Growing Industry—ELECTRICAL APPLIANCE REPAIRING.

Name.....

Address.....

City.....State.....



Copyrighted material

# OFFERS LOW COST LIFE INSURANCE

**Postal Life offers $2000. in Protection for $1.78 monthly (age 21). Other Ages in Proportion**

## THIS PREMIUM HALF PERMANENT RATE

NEW YORK, Saturday. Postal Life of New York, unique among the important Old Line, Legal Reserve Life Insurance Companies, is again offering this special modified policy, already owned by thousands of American families. You pay half the permanent rate until the 5th year; as little as 89c per $1000.00 of Solid Protection at age 21. You pay only $1.13 per $1000. at 30; $1.56 monthly at 40; proportionate amounts at other ages. At these low rates, $1500. is the minimum amount that can be offered.

For your convenience we print below a coupon form that can be clipped out and sent to Postal Life in New York. Full information, rates, etc., will be sent to you promptly. There is no obligation to buy but we advise immediate action. Life Insurance is vital to your future and your family's welfare. Postal Life Insurance Company, 511 Fifth Avenue, New York 17, New York.

**Postal Life Insurance Company**
**511 Fifth Ave., Dept M-577, New York 17, N. Y.**

Mail me complete information about your low-cost Modified "4" Policy at my age.

Name .....

Occupation ..... Date of Birth.....

Address .....

.....

Include Postal Zone, if any

Say You Saw
It In POPULAR SCIENCE

# WHEN BOOMS GO BUST WILL YOU BE BROKE OR BUSY ...in a well-paying GOVERNMENT JOB?

(Thru CIVIL SERVICE)

CAREER TRAINING INSTITUTE will...

..prepare you NOW (Men and Women) at home thru broad, intensive, simple training to take tests for good jobs offered in Civil Service. Hundreds of classifications, many jobs for 1946, every chance to advance. Vacations with pay, pensions, sick leaves. No layoffs, no strikes, no discrimination. Our course is so inexpensive, no sensible person should delay mailing coupon TODAY.

**CAREER TRAINING INSTITUTE, Dept. 201-A**
1060 Broad Street, Newark 2, N. J.

Please send me FACTS regarding Government Employment (Civil Service), and how your course will help prepare me for tests.

*Name*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

*Veteran?* *yes*_____ *no*_____

VETERANS GET PREFERENCE

# STUDY AT HOME

**With An Educational Institution**

Men with specialized training win higher positions, insure larger earnings, and are bigger successes in business and public life. Opportunities NOW greater than ever before. Send for our Catalog.

## ARTS and SCIENCES

Courses in Philosophy; Education; Letters; Public Health; Medical Jurisprudence; Psychology; Sociology; Physics; Chemistry; Plastics; Geology; Political Science; Theology; Business and Commerce; Accounting; Mathematics; Statistics; Agriculture.

## ENGINEERING

Courses in Electrical, Civil, Mechanical, Drafting, Architectural, Steam, Aeronautical, Radio, Structural, Mining, Industrial, Petroleum, Marine, Chemical, Diesel, Automobile, Refrigeration, and Air Conditioning Engineering.

## LAW

Complete Professional Law Course includes 20 Hornbook Series college grade textbooks. Courses also in Commercial Law, Patent Law and Medical Jurisprudence.

**McKinley-Roosevelt Incorporated, 4610-AB, Sheridan Rd., Chicago 40, Ill.**

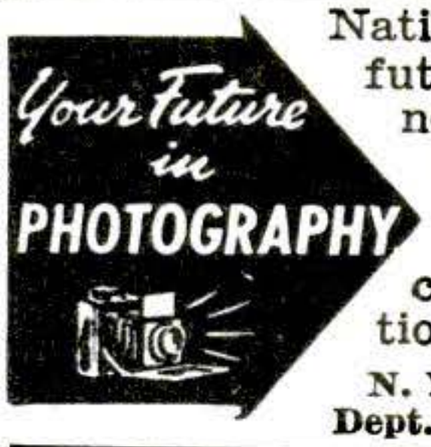
# MUSIC LESSONS

**LEARN . . PROGRESS . . EARN MORE . . $ . . SUCCEED . . $**

Your own achievement, popularity, success through music. Learn in your home. Check course: Piano, Violin, Cornet, Saxophone, Clarinet, Guitar, Harmony, Arranging, History. If juvenile, parent's signature must accompany inquiry. Low cost. Easy Terms. FREE Catalog.

**Suite U389, 765 Oakwood Bl., Chicago 15**

**UNIVERSITY EXTENSION CONSERVATORY**




Nationwide opportunities, sound future waiting. Photographers needed by studios, newspapers, advertisers, in business, industry, science. Qualify through success-proved home study courses. Also resident instruction. Write for full details.

**N. Y. INSTITUTE OF PHOTOGRAPHY, Dept. 5, 10 W. 33 St., New York 1, N. Y.**

# REFRIGERATION

Repair and adjust all refrigerators. New manual tells how. Charts and pictures to help you. Price only $1, postpaid. Money back guarantee.

**Supreme Publications, 9 S. Kedzie Ave., Chicago 12, Ill.**

# RADIO

**ENGINEERING,** Broadcasting, Servicing, Electronics, Aviation, Marine & Police Radio taught thoroughly. 48 weeks' Engineering course equivalent to 3 years' college radio work. Approved Veteran Training. Co-educational. Catalog upon request.

**Valparaiso Technical Institute. Dept. 503, Valparaiso, Ind.**

## Learn BAKING At Home

Baking is one of America's high industries in wages. Nearly depression-proof. Thorough basic home course lays sound foundation. If you have aptitude, write for FREE BOOKLET, "Opportunities in Commercial Baking."

**National Baking School, 1315 Mich. Ave., Dept. 1365. Chicago 5**

# DRAFTING

**SPRINGBOARD TO SUCCESS!**

Increased salary, larger responsibilities, a real career instead of just a job—these are to be had by the trained draftsman. I.C.S. makes the way to thorough, practical training open to you. Check up and you'll find that nearly every "big name" American in engineering and production acquired experience at the drafting board. Many of them started by writing for the I.C.S. free booklet. Send for it today! It can be the most important act of your life.

**INTERNATIONAL CORRESPONDENCE SCHOOLS**
**BOX 7659-L, SCRANTON 9, PENNA.**

Send me full information on the following subject:

.....

*Name*.....*Age*.....

*Home Address*.....

*City*.....*State*.....

*Present Position*.....*Working Hours*.....*A.M. to*.....*P.M.*

Copyrighted material

# HAVE YOU THE COURAGE TO LEARN THE TRUTH ABOUT YOURSELF?

IF YOU ARE *honest* with yourself, you will admit that *something* must be wrong with you—or you would, by this time, have achieved *much* greater financial, social, vocational or professional success! You know it isn't a matter of education, for too many dull, uneducated, ignorant people have reached greater heights than you have, while at the same time too many brilliant, cultured, highly educated people are worse off than you are.

The truth is, you have, within you, *all the ingredients you need* to make you vastly richer in money, friends, position, public esteem and *self*-esteem—but somewhere in your make-up there are *brakes* which hold you back. These brakes may be habits of thinking which nullify the power you generate! You do not know what these brakes are, or what to do about them. You may recognize them in others, but you cannot see them in yourself. You are *too close* to yourself! You know *too much* about yourself! You find it too easy to *justify* everything you say and do! YOU ARE A HERO TO YOURSELF! In short, you make virtues of your vices, assets out of your liabilities, and "successes" out of your *failures!*

You have probably been "excusing" yourself and blaming *outside* forces for years. You will probably continue to do so for the balance of your life unless something or someone REVEALS YOU TO YOURSELF. When this happens, you will at least KNOW WHAT HAS BEEN HOLDING YOU BACK! But *until* this happens you will be working against unseen, unrecognized enemies—fighting IN THE DARK against vicious, sneering, laughing FLAWS IN YOUR WAY OF DEALING WITH OTHERS—if you fight at all! Have YOU the courage to learn the TRUTH about yourself?

## What the Truth May Mean to You

My name is James Maratta. My profession is that of Counselor in Human Relations. For 22 years I have devoted my time to the study of people—their actions and reactions. I have been retained by some of the largest Corporations in America to straighten out the thinking of their employees as related to the people with whom they come in contact.

I have traveled from one end of the country to the other, listening to the hopes, ambitions, and failures of men and women of all ages, in all walks of life, in every conceivable social, financial, vocational, and professional position.

I have analyzed thousands of business men, lawyers, doctors, storekeepers, clerks, housewives, salesmen, mechanics, and others who felt that *something* was holding them back. And I am now advising nearly 30,000 people a year on the subject of their right and wrong methods of dealing with others!

### What I Discovered About People

My whole experience points to the one unalterable fact that everything we accomplish in life is accomplished through our relations with other human beings. Whether we want more money, more love, more comfort, more authority, more leisure, more peace of mind, more security, more customers, or *whatever* it is, it *must come from other people*

You cannot do it alone, no matter how brilliant you are, no matter how much you read or learn, no matter how complete and thorough your education has been, no matter how skilful you may be. Unless you can *capitalize* on what you know, you will not advance much farther. We are not self-sufficient unto ourselves. Neither are *other* people self-sufficient unto *themselves*. They need *you* as much as you need *them*. But when there is conflict, or lack of complete harmony in thought and action, both parties suffer. And you wonder what is wrong with *you*.

There is really *nothing* wrong with you except your inability to understand how to gear your thinking to the thinking of the people you *want to do business with and who are eager to do business with you!*

When you fail to make a sale, or satisfy a patient, or get a vote, or increase your salary, or acquire a better job, or convince your wife, or win an argument, or convey instructions, you have failed to use the simplest and most effective weapon *at your command!* Let me tell you what this weapon is.

The first thing I do is to awaken you to the importance of *forgetting* about what you *think* are your own weaknesses. Then I tell you wherein your *strength* lies. I do not try to make you over, mentally, physically, or spiritually. I take you for what you are, just as I teach you to accept other people for what *they* are.

I reveal your mistakes in dealing with other people and show you how to avoid them. I show you why you, and the "other fellow," are far less important to each other than the objectives you both want to reach!

My analysis will simplify your ideas of what you should do *now*, and will clarify your planning for the future. It will help you determine whether or not you are following the path of least resistance in getting what you want from *people*—the only source of all the riches that can possibly come to you!

### Let Me Analyze You

If you have been worried about yourself, or if you feel that you are capable of far greater success than you have attained, let me check up on your processes of thinking.

Whatever your occupation, profession, or vocation—whether you are a banker, teacher, executive, clerk, laborer, housewife, storekeeper, owner of a small business—I believe sincerely that I can help you. Let me send you my Copyrighted Questionnaire. Your answers (boiled down to simple "Yes" or "No") will tell me what effect your methods have on others and what effect their reactions have on you.

I will then send you my three-page report. When you get it you will open your eyes! If you are like most of the 30,000 people I analyze every year, you will say I "hit the nail on the head." And the self-advancement advice I will give you may change the entire course of your life!

### All for Only One Dollar

My price for this analysis of your self-advancement assets and liabilities is only one dollar. That is all you pay. There are no instalments, no extra charges. And, though you may be surprised, shocked, startled at the revelations I will make to you, I guarantee that you will be satisfied. If not, I will refund your dollar at once.

Yes, if you don't think I have told you the truth about yourself, if you don't feel sure that the advice I have given you about your dealings with *people* is worth a dollar—just tell me so and your dollar will be sent right back to you. You have nothing to lose.

But if what I tell you helps you—as it has helped tens of thousands of others—you will say your investment was the most profitable one you ever made, or ever will make!

### Just Mail the Coupon—NOW!

Finally—don't delay, for your own sake. It's never too late to do something for yourself, but the mere act of delaying, of putting it off, is *negative*. It makes your "indecision" rut deeper. ACT NOW. Mail the coupon this very minute.

**JAMES MARATTA** 5
**Counselor In Human Relations**
**Rockville Centre, N. Y.**

Dear Counselor: I am enclosing one dollar for which send me your special Copyrighted Questionnaire. I will answer your questions to the best of my ability and you in turn are to send me your analysis based on my answers. If I am not satisfied with your analysis, you agree to refund my dollar. There are to be no other charges. Send mail under plain, sealed cover.

Mr. / Mrs. / Miss .....
*(Please Print Plainly)*

Address.....

City.....Zone.....State.....

Occupation.....



Copyrighted material

# 10,000 HELPS TO BE YOUR OWN BOSS IN THIS BIG BOOK!

924 BIG PAGES ILLUSTRATED

**IF IT'S RESULTS YOU WANT—GET ACTION QUICKLY WITH THESE PRACTICAL IDEAS**

**Never before has a more helpful book been printed for those planning a business of their own. Gathered in this large illustrated volume are the formulas, recipes, facts and secrets that have contributed so largely to America's great industrial progress. Capitalize on this information for making most any conceivable product without experience, special equipment or previous knowledge of chemistry. Start at home, expand with profits—build for a profitable independence.**

The experts who compiled this book are authorities, and present this information in simple, understandable language. They also give you wholesale supply sources for needed materials, short cuts and economy methods for the most profitable results. Hundreds of good paying businesses have been built on a product made from a simple recipe. Opportunities in this field exist everywhere. Choose from any of the 162,000 facts and 10,000 formulas of which the following are only a very few: Adhesives, Alloys, Anti-Freeze Solutions, Cosmetics, Beverages and Liquors, Candy, Gum, Casein, Celluloid, Ceramics, Cheese, Cleaning Preparations, Concrete, Copper, Cotton, Dentifrices, Depilatories, Dyes, Embalming Fluids, Enameling, Glass, Glazes, Household Formulas, Inks, Insecticides, Iron, Jewelers' Formulas, Lacquers, Laundry Preparations, Leather, Linoleum, Lubricants, Manicure Preparations, Marble (artificial), Metals, Mirrors, Oils and Ointments, Paints, Paper, Perfumes, Photography, Polishes, Powders, Remedies for Man, Beast or Fowl, Rubber Products, Refrigerants, Soaps, Solder and Soldering, Tooth Cements, Transfers, Transparencies, Varnishes and Thousands of others for making all sorts of profitable and practical things.

**INCLUDED**

Formulas for "D.D.T." insecticide. Also our New Book of Money Making Facts: "The More You Know the More You Can Earn—Easier and Quicker."

***FORTUNES MADE FROM A SINGLE IDEA!***

This comprehensive book is an accepted authority by chemists, schools, industry, etc. and is the largest and most comprehensive book of its kind ever issued. Nothing else like it in existence. A single formula has been worth a thousand times this book's small cost to countless owners. Crammed with money-making ideas. Invaluable for reference. Ideal for Factory, Home, Farm, Office or Workshop. As necessary as the dictionary and more useful for manufacturers, chemists and salesmen who put up products for profit.

POSTPAID! $3.50 U.S.A. $3.85 FOREIGN

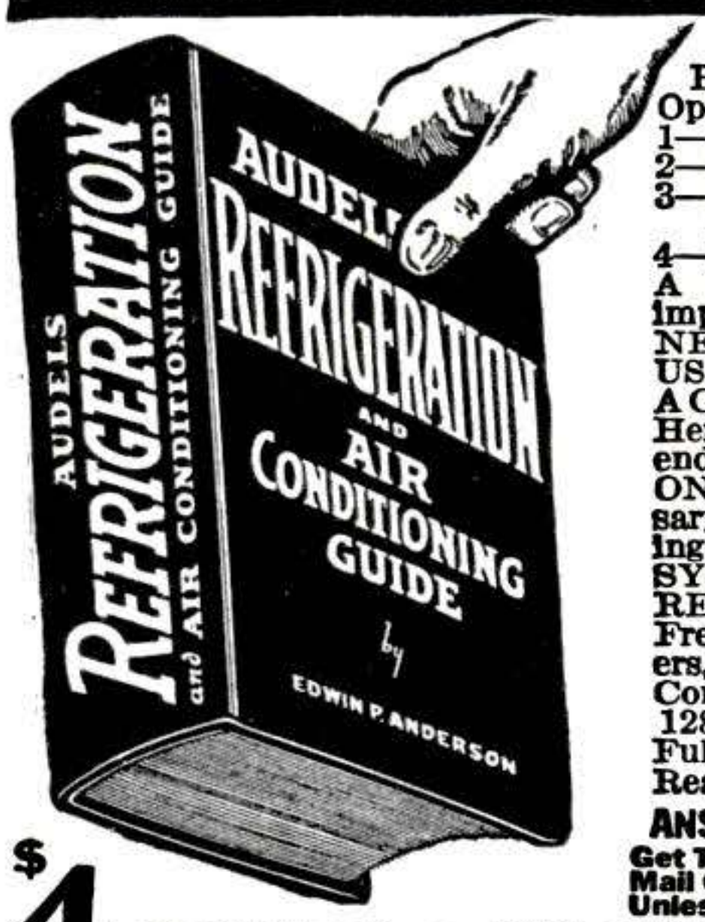
**$3.50 postpaid. Canada or Foreign. $3.85 U.S. Funds. (C.O.D. shipments U.S.A. only.) Immediate Shipment—Safe Delivery Guaranteed.**

**ADAMS BROWN COMPANY, Dept. 265**
**Chestnut Hill 67, Massachusetts, U.S.A.**

---

**JUST OUT! NEW FROM COVER TO COVER**

# AUDELS REFRIGERATION and AIR CONDITIONING GUIDE




**4 Books in One! Covering:**
Basic principles, Servicing, Operation, Repair of
1—Household Refrigeration
2—Special Refrigeration Units
3—Commercial & Industrial Refrigeration
4—Air Conditioning Systems

A gold mine of essential important facts for ENGINEERS, SERVICEMEN & USERS.

A Good Book is a Good Friend! Here you have at your fingers' ends a Complete Library in ONE VOLUME, the necessary data you have been looking for on: MODERN UNITS, SYSTEMS & MACHINES, REFRIGERANTS, including Freon, Lockers, Water Coolers, Quick Freezing & Air Conditioning Systems.

1280 Pages, 46 chapters all Fully Illustrated & indexed for Ready Reference.

**ANSWERS YOUR QUESTIONS**

**Get This Information for Yourself. Mail Coupon Today. No Obligation Unless Satisfied. ASK TO SEE IT.**

**$4 COMPLETE • PAY ONLY $1. A MONTH ←**

**AUDEL, Publishers, 49 W. 23rd St., New York 10, N.Y.**

**MAIL AUDELS NEW REFRIGERATION GUIDE for free examination. If O.K. I will send you $1 in 7 days; then remit $1 monthly until price of $4 is paid. Otherwise I will return it.**

Name _____

Address _____

Occupation _____

Employed by _____ P.S.M.

---

**BE YOUR OWN BOSS — OPERATE YOUR OWN PROFITABLE BUSINESS**

# HOME and INDUSTRIAL APPLIANCES

## SERVICE—REPAIR—INSTALLATION

ONLY shop training course of its kind. Gives you actual shop training on washing machines, manglers, heat control systems, water heaters, toasters, vacuum sweepers, etc., etc. Work on actual machines under trained instructors. Low tuition. Old established school. Most complete training course of its kind. Investigate this opportunity—its money-making possibilities and the need for trained men. Write today for details. No obligation. Veterans ask for GI plan. Act now!

**APPLIANCE TRAINING SCHOOL—Dept. 51**
***Division of Commercial Trades Institute***
**6312 N. Broadway—Chicago 40, Ill.**

---

***Be Your Own Boss — In Your Own Business***

Start at home . . . small capital needed . . . prepare for exciting plastics jobs or Your Own Plastics Business. We teach you Fabrication and Casting right in your own home. All materials furnished. Send ad with name and address for information.
VETERANS: Eligible for resident training under G. I. bill, Check here ☐

***LEARN***

# PLASTICS

**PLASTICS TECH**
School *of* America, *Inc.*
5200 Euclid Avenue
Dept. S5
Cleveland 3, Ohio

---

# *Earn Extra Money!*

***MAKE OBJECTS OF BEAUTY FROM USED TIN CANS.***

Thousands are turning discarded tin cans into objects of beauty that command high prices! You can do the same with the help of our handy book . . . TIN CAN PROJECTS. It shows you how to make many useful items and gives you ideas for HUNDREDS more. Provides many hours of highly profitable fun. Satisfaction guaranteed or money back.

**Postpaid 1.50** — SEND TODAY — **C. O. D. 1.74**
**GATEWAY BOOK CO., Dept. PS-17**
**32 N. State Street Chicago 2, Ill.**

---

# *Learn PHOTOGRAPHY at Home*

Splendid opportunities. Prepare in spare time. Practical basic training. Long-established school. Send for free book, "Opportunities in Photography." No obligation.

**American School of Photography, 1315 S. Michigan Ave., Dept. 1365 Chicago 5, Ill.**

---

*Learn to Write*

Begin today. Write now for our Free Book, "How to Become a Good Penman," it contains specimens and tells how others learned to write in spare time. Enclose 10c for your name beautifully written and a pen point suitable for shaded writing. Write today.
**THE TAMBLYN SCHOOL OF PENMANSHIP**
**N-439 Ridge Building, Kansas City, Mo.**

---

***Thrilling Work* COLORING PHOTOS**

EASY TO LEARN

Fascinating vocation learned at home by those with aptitude. Thrilling pastime. National method brings out life-like colors. Free booklet.
**NATIONAL PHOTO COLORING SCHOOL**
**1315 S. Michigan, Dept. 1365, Chicago 5**

---

# DRAW for MONEY

# BE AN ARTIST!

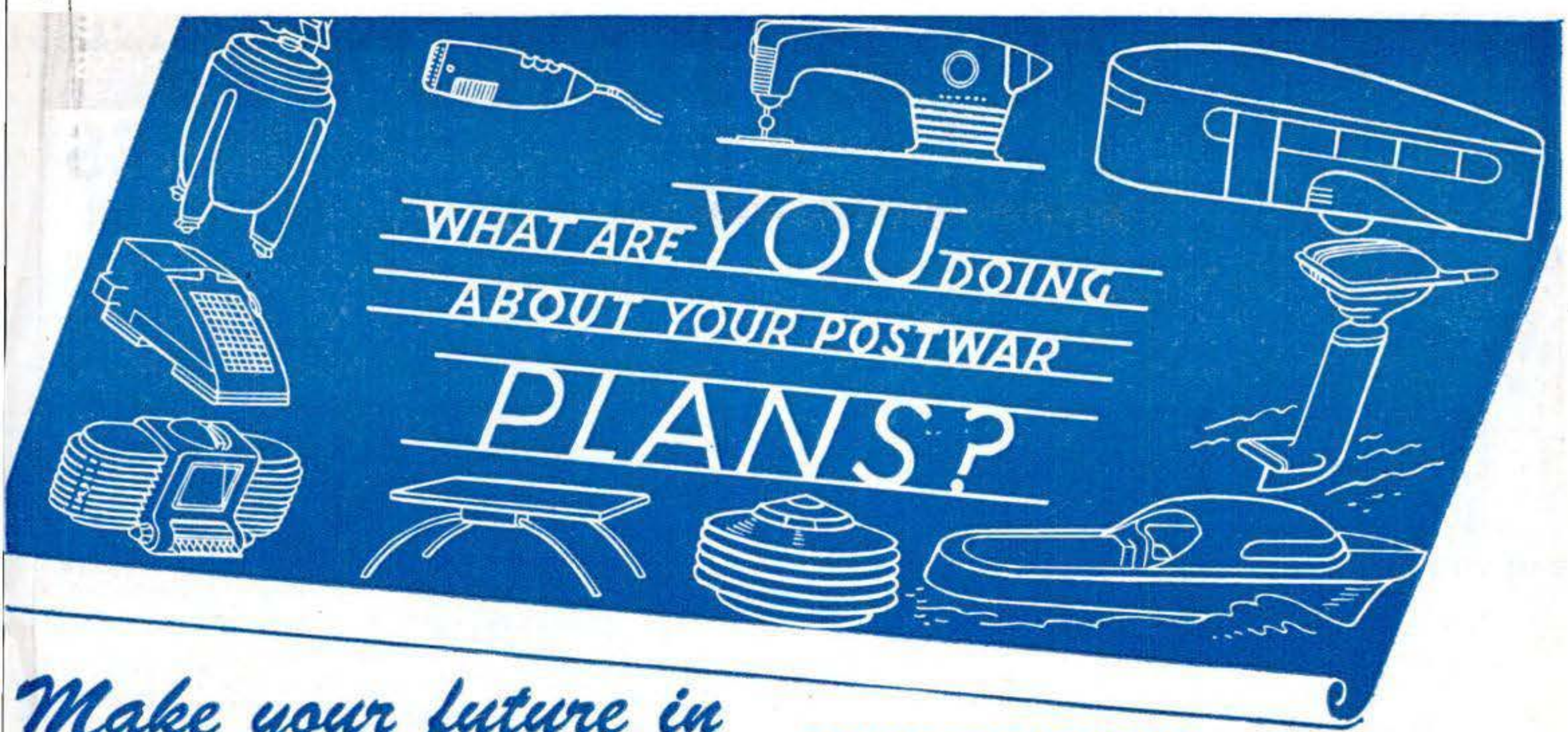
**Trained Artists Are Capable of Earning $40, $60, $75 a week Use Your Spare Time to Prepare for a Profitable Art Career! COMMERCIAL ART, DESIGNING and CARTOONING**
*—all in ONE complete home study course.*
No previous Art experience necessary—we teach you step by step—hundreds have profited by our practical method. TWO ART OUTFITS FURNISHED. Colorful, FREE BOOK, "Art for Pleasure & Profit"—tells all about our course, service, what our graduates say and commercial opportunities for you in Art. Mail coupon today.

**FREE BOOK gives details!**

**WASHINGTON SCHOOL OF ART**
**Studio 135-C, 1115 15th St., N.W., Wash. 5, D.C**
Send me your booklet and full particulars about your course

Name . . . . . AGE . . . . .
Address . . . . . .
City . . . . . Zone . . . . . State . . . . . .

Copyrighted material




# *Make your future in* PLASTICS

Every day you read of new and wonderful uses for plastics in this, our postwar world. The wide range of objects that can be made of plastics—from buildings to surgical appliances, from cars to textiles—challenges the imagination.

**THE PLASTICS ERA IS HERE**—Are you ready? Opportunities are opening in every branch of the plastics industry. Plastics know-how is necessary in practically every type of manufacturing. Are you capable of grasping these opportunities? If you want a choice position in this expanding plastics field, or a business of your own, act *now*—get in on the ground floor!

**A COMPLETE COURSE**—You learn the various phases of plastics from this course . . . materials, designing, molding, fabricating, laminating and testing. You acquire a basic knowledge of plastics that can be invaluable to you in acquiring the type of position you want in this great new industry.

**YOU LEARN AT HOME**—Your present work need not be interrupted, and this thorough, easy-to-understand course requires no previous technical experience.

**EXCLUSIVELY PLASTICS**—Plastics Institute is America's oldest and largest educational organization which devotes all of its facilities exclusively to plastics.

**YOU MAKE THINGS — We supply materials.** To give you practical experience in working with plastics, we supply handsome, colorful, rods, sheets and tubes of plastics from which you make useful, attractive creations. You saw, cement, buff, form, dye, decorate, cast and laminate various types of plastics. You also design your own plastics articles—develop your own ideas. You may earn money while learning.

**START YOUR FUTURE TODAY**—Mail the coupon below, now! You will get an interesting, illustrated, free booklet with valuable information about plastics. You will see how, at small cost you can prepare for a future in this important industry while carrying on your present work. Clip this coupon and mail it TODAY!

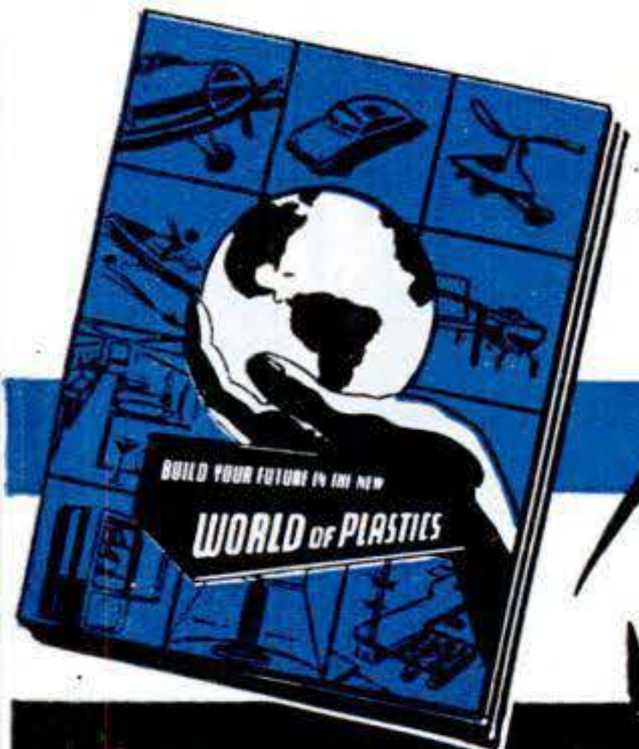
***VETERANS ASK ABOUT G. I. TRAINING.***

**NEW YORK** — **Dept. PS 6-5, 122 E. 42nd St.**

**CHICAGO** — **Dept. PS 6-5, 221 N. LaSalle St.**

**LOS ANGELES** — **Dept. PS 6-5, 1601 S. Western**

***SPECIAL RATES FOR SERVICE MEN***




**FREE BOOKLET**
*Send For It Today!*

*Plastics*
**INDUSTRIES TECHNICAL INSTITUTE**

**Plastics Industries Technical Institute.**
**221 N. La Salle St., Dept PS 6-5 Chicago 1**

Mail in Envelope or paste on penny postcard

Gentlemen: Please send me the booklet "World of Plastics" and information on your training program. I understand there is absolutely no obligation.

**Name**.....**Occupation**.....

**Street**.....**Age**.....

**City**..... **Zone**.....**State**.....

☐ Veterans: Check for special information. ☐ If under 18: Check for special booklet.



Copyrighted material

# AUTO

## BOOKS ON APPROVAL

**SEND NO MONEY.** Just mail the coupon for a complete set of Six Big Auto Books. 20th Edition. Whether you are a mechanic or helper, expert or apprentice, auto owner or driver, take immediate advantage of this FREE EXAMINATION OFFER.

**MAKE GOOD MONEY NOW**
**HOLD A PERMANENT JOB**

America wants its automobiles kept in good repair. Men with "know how" are in demand, at big pay. These books will help you get and hold an important job, or give you a chance to go into business for yourself now or later. Any man who half tries to improve himself can learn auto servicing and repairing by this quick reference method. Use the JIFFY INDEX to find easily understood answer to any auto problem. These wonder books prepared by eleven of America's great automobile engineers. Many hundreds of valuable illustrations. Send the coupon TODAY.

**CAN YOU FIX IT?**

These wonder books tell step by step HOW to make difficult repairs and adjustments, how to keep a car at maximum efficiency, including latest improvements in car design and operation. Engine troubles and how to correct them well covered.

**6 BIG VOLUMES**

2800 pages, 2000 illustrations, wiring diagrams, etc., including **Diesel engines.** Beautiful modernistic, washable cloth binding.

**[A year's consulting privileges with our engineers now given with these books without extra charge.]**

*Vocational Publishers Since 1898*

**AMERICAN TECHNICAL SOCIETY, Dept. A520**
**Drexel Ave. at 58th St., Chicago 37, Ill.**

I would like to examine your Six-Volume Set of Auto Books. I will pay the delivery charges only, but if I choose I may return them express collect. If after 10 days use I prefer to keep them, I will send you $2 and pay the balance at the rate of only $3 a month until $24.80 has been paid. Please include consulting service as offered above.

Name .....

Address .....

City ..... State .....

Please attach letter stating age, occupation, employer's name and address, and name and address of at least one business man as reference. Men in service, also please give home address.

# WANTED MEN AND WOMEN

## who crave more MONEY—HAPPINESS—SUCCESS

**You Will be DELIGHTED—EXCITED—SPELLBOUND**

*Insure Yourself Against Failure*

**Complete Course of**

## 13 Steps To Riches

## *only* $2.00

**125,435 copies sold. Learn the new easy way to get what you want. Find the secret of Andrew Carnegie's money making plan**

**—— WHAT READERS SAY ——**

"Stayed Awake All Night Reading It"
"Wouldn't Take $1,000 For it"
"Greatest bargain in 60 years"
"Gave me returns a hundred-fold"
"It's a gold mine"
"A Road Map to Success"
"Gave me courage to coin big deal"

## SEND NO MONEY Make This Easy 5-Day Test

Just send your name and address today. On arrival deposit $2.00 plus few pennies postage with your postman. That's all there is to it. Read, "Think & Grow Rich" 5 days. Then if you don't think the book will help you to get more money—happiness—success—return the book and get your money back.

**RALSTON SOCIETY, 124 Engineers Bldg., Cleveland 14, Ohio**

**Ralston Society, Dept. P.S.I. Cleveland 14, Ohio**
Send "Think and Grow Rich" to me for 5 days Trial under your money-back guarantee. I will deposit $2.00 with postman plus few pennies postage.

Name .....

Address .....

City ..... Zone ..... State .....

☐ Check here if you want to save postage. Then enclose $2.00 check, money order or cash, and we will pay all postage and handling charge.

# START YOUR OWN BUSINESS!

**Amazing Postwar Development Now Gives You the Opportunity to Make Money Fast!**

Startling scientific discovery, just now becoming available for general use, will enable you to start your own business and reap great profits!

Plastics, one of the most revolutionizing and rapidly expanding industries, offers a great opportunity to all enterprising **men** and **women.** This is one of the few industries in which home manufacturers thrive and prosper. You can start even on a spare time basis in your own home, and expand rapidly into a full time business, paying good profits.

**LIQUID MARBLE**

Make LIQUID MARBLE the amazing Plastic, with a thousand uses. LIQUID MARBLE can be poured into FLEXIBLE MOLDS for casting all kinds of artistic and serviceable articles such as: ornaments, novelties, desk sets, paper weights, book-ends, souvenirs, statuary, toys, etc.

**FLEXIBLE MOLDS**

Make your own FLEXIBLE MOLDS. The cost is low—in fact, a large sized mold costs but a few cents. Hundreds of casts can be taken from a single mold.

**NO EXPERIENCE NEEDED!**

No skill or previous knowledge is necessary. All you do is follow our easy-to-understand instructions.

**UNLIMITED MARKET**

The market is literally unlimited. You will find steady year-round demand in your own community. Your problem will not be in Selling but in supplying the huge pent-up demand. Moreover, we supply you with names of **big buyers** for your finished products.

**WRITE TODAY**

Bing Products will show you how to start with a small investment and build a permanent, independent, profitable business! Don't fail to grasp this opportunity! Write today for FREE CATALOG.

**BING PRODUCTS** Dept. B4, 88 Broad Street Boston 10, Mass.

# NEW PRACTICAL BOOK MAKES HOUSE PAINTING . . . . . EASY

New practical book . . . House Painting Methods . . . more than pays for itself . . . and saves you plenty by showing you how you can do your own painting and save many dollars. Even if you have never painted a thing before this big book will show you how to do a professional like job. Satisfaction Guaranteed or money back.

Postpaid **$3.00** SEND TODAY C. O. D. **$3.35**
**GATEWAY BOOK CO., Dept. PS-17**
32 N. State Street Chicago 2, Illinois

# *Learn* CHINESE

Read, write and speak Chinese [Mandarin] by correspondence. Write today to—
King's Institute—P.O. Box 1055, Dallas, Texas

# Learn TOOL DESIGN

Now, as never before, draftsmen and tool designers are needed to redesign for peacetime reconversion. Qualify quickly. Many making $100 to $150 per week. More qualified men needed than available. Good pay jobs waiting. Rush name and kind of job wanted today for full free facts. State age.

**OHIO INSTITUTE OF TECHNOLOGY, Box 308, Greenville 2, Ohio**

## GET INTO CARTOONING!

Learn to cartoon! Big pay! Easy, enjoyable work! Cartoon Course, Gag Course, Anatomy Course & Business Course full of plans, markets, ideas. Drawing set and criticisms. All one low price. Rush card for details.

**Hartman Studios, 2438 W St., Lincoln 3, Nebr.**

## The Feuchtinger Method

**develops to the utmost the natural charm of your Voice**

Train yourself at home. Write for voice book —free. Sent only to those over 17 years of age.

**PERFECT VOICE STUDIOS**
**Kimball Hall Bldg., 25 E. Jackson, Chicago 4, Studio 1365**

# SHORTHAND in 6 Weeks at Home

**Famous Speedwriting system. No signs or symbols; uses ABC's. Easy to learn; easy to write and transcribe.** Fast preparation for a job. Surprisingly low cost. 100,000 taught by mail. Used in leading offices and Civil Service. Write for free booklet. **Speedwriting, Dept. 2605-6, 55 W. 42 St., N.Y. 18, N.Y.**

# Big Money for Workers In Home or Shop

**Licensed Concrete Specialists wanted. No experience needed. Make *Colorglazed* concrete pottery without molds. New, low cost, patented method. Cemetery products, novelties, tiles, floors, etc. Basement leaksealing. Other big pay projects. Bookiet, details free. Men only.**

**NATIONAL POTTERIES COMPANY**
**542 West Lincoln, Fergus Falls, Minnesota**



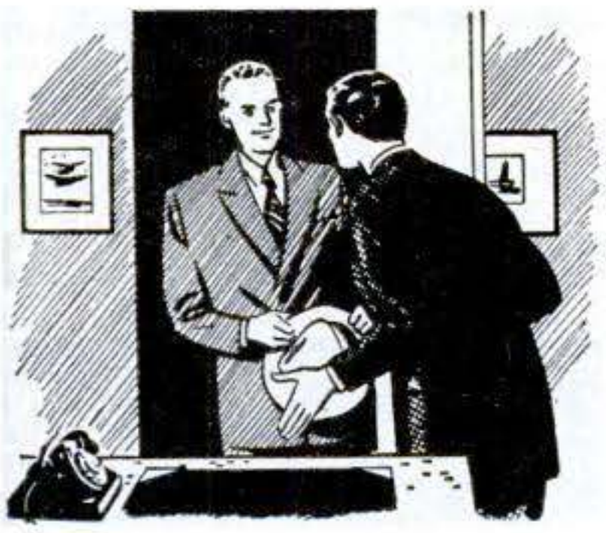
Copyrighted material

# YOUR CIVILIAN AVIATION CAREER

**PREPARE for it WISELY with *MODERN* Training**

# at NORTHROP AERONAUTICAL INSTITUTE

(Division of Northrop Aircraft, Inc.)

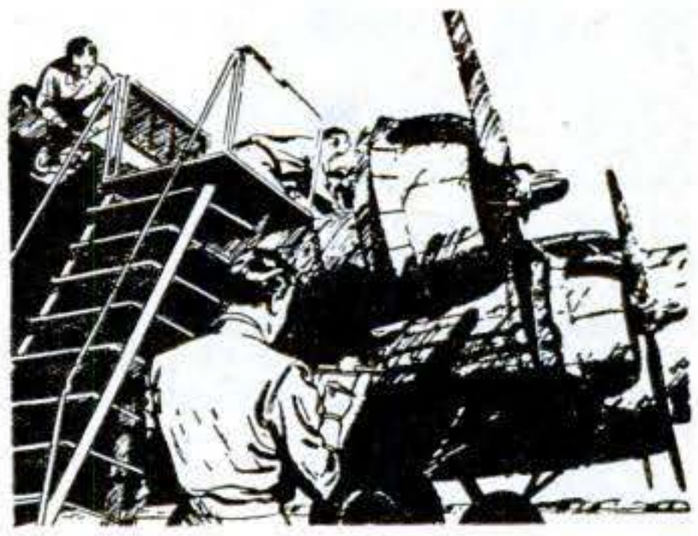


### Your Surest Way to an Aviation Career

Opportunities in aviation are tremendous—CAA and other responsible sources estimate *hundreds of thousands* of new jobs. The best positions will go to trained men. Invest your time now in thorough training at Northrop! Then enter aviation *fully prepared* to take advantage of the best opportunities.

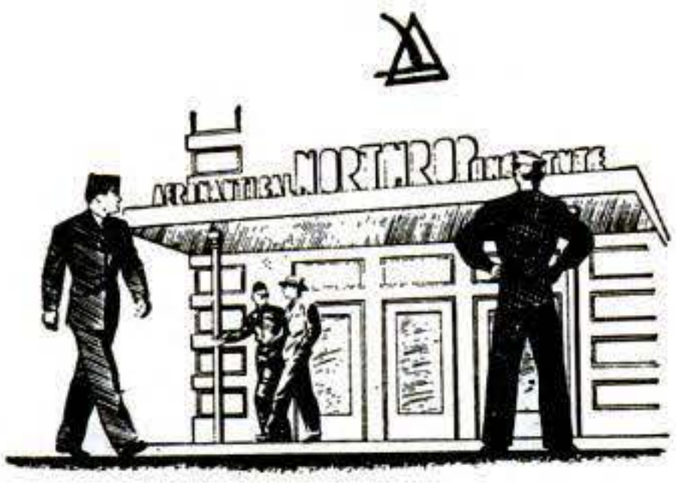
### Learn Aeronautical Engineering

You can now get thorough practical training in Aeronautical Engineering *quickly* — through the *modern,* intensive Northrop training program. Basic and advanced courses are available. When you are graduated, you are a trained, practical engineer . . . *well equipped and competent to take your place in the aviation industry.*



### Up-to-the-minute Course in Mechanics

Special methods of presentation of the Aircraft and Engine Mechanics (A&E) course have been developed for the exclusive use of Northrop students. Your training is supervised by men *actually in* the industry — men who *know today's requirements.* Thus you learn thoroughly every detail of *modern* aviation mechanics.



### Enjoy Completely New Training Facilities

You enjoy your training and learn more easily, using modern equipment and facilities. At the Northrop Aeronautical Institute, even the specially designed school buildings are new . . . and located on mile-long Northrop Field, in the midst of the Northrop engineering, research, and production plants and laboratories.

### Live in Sunny California

Northrop Field is located between the Pacific Ocean and the Sierra Mountains, near downtown Los Angeles and Hollywood. You can enjoy Southern California recreations — ocean surfing and bathing, skiing, all-year tennis, desert and mountain hiking and riding, plays, music, parks, and other entertainment.

### Veterans Eligible for Benefits

The Northrop Aeronautical Institute has been approved for the training of Veterans under the G. I. Bill of Rights. Veterans attending the Institute are eligible for educational benefits as provided by this Bill. A special "priority" reservation is available to those not yet discharged from the armed forces.

DEDICATED TO THE ADVANCEMENT AND

**NORTHROP**

**AERONAUTICAL INSTITUTE**

1525 E. BROADWAY, HAWTHORNE
LOS ANGELES COUNTY, CALIF.

TRAINING OF MEN FOR CAREERS IN AVIATION

**SEND COUPON FOR FULL INFORMATION**

**NORTHROP AERONAUTICAL INSTITUTE**
**1525 East Broadway, Hawthorne, Los Angeles County, California**

Please send me your free, illustrated booklet and information, including starting dates and tuition rates, on the training course checked below.

☐ Aeronautical Engineer ☐ Master Aircraft and Engine Mechanic (A & E)

(Name)

(Address) (Age)

(City) (Zone) (State)

Check one: ☐ Veteran ☐ In Service ☐ Civilian



Copyrighted material

# REFRIGERATION AIR CONDITIONING

MODERN SHOP TRAINING

approved **GI** training

**TRAIN WHERE THE ARMY TRAINED IN THE SHOP OR AT HOME**

This new, fast growing industry needs trained men now! It's fascinating work—easy to learn in our big shops—or train at home on special assignments and finish with practical intensive shop training. G.I. approved for home study, too. Same course and instructors from Army Training program attests the thoroughness and professional level of this long established institute in modern refrigeration and air conditioning.

**STUDY AT HOME IN YOUR SPARE TIME FINISH IN OUR BIG SHOPS**

**LEARN BY DOING—WORK ON REAL MACHINES**

Proven training methods and expert instructors get you into the heart of this work immediately. Work wih tools on actual machines right from the start. It's practical, interesting and it gives you the "know-how" and the "know-why" that distinguishes CTI graduates in the field today. Investigate this opportunity now! Certificates issued.

**FREE** **BIG 16 PAGE BOOK OF VITAL INFORMATION** Tells you the true facts . . . gives you vital information on CTI approved training.

**RUSH COUPON TODAY FOR FULL DETAILS**

ACT NOW! LEARN IN YOUR SPARE TIME AT HOME

**Commercial Trades Institute, Dept. S25**
**209 W. Jackson Blvd., Chicago 6, Ill.**
**200 S. 20th St., Birmingham, Ala.**

Without obligation, please send me the facts. Let me judge for myself the opportunities and post-war security this training offers.

☐ Check here if interested in GI training.

Name.....

Address.....

City.....State.....

# INVENTORS

## *Do Not Delay*

Have you ever been startled by seeing a successful article on the market, and exclaimed —"Why, I invented THAT 5 years ago—I didn't think it valuable enough to Patent!"

The Patent Laws were intended for the Protection of the Inventor, and the Inventor who slumbers on his Rights may wake up to find someone else reaping the reward that could have been his.

Write NOW for Information and Record of Invention form FREE. RANDOLPH & BEAVERS, Registered Patent Attorneys, Columbian Bldg., Washington, D. C.

**PERSONALIZED SERVICE — REGISTERED PATENT ATTORNEYS**

## RANDOLPH & BEAVERS

**905-L Columbian Bldg., Washington, D. C.**

Please send me full particulars on Patents, fees, etc., and "RECORD of INVENTION" form—FREE.

Name.....

Street.....

City.....State.....

# *Get Started in Radio*

**TEN "HOW-TO-DO-IT" BOOKS**

Get a solid foundation in radio by means of these 10c timely text books. Each clearly written, profusely illustrated, contains over 15,000 words. You'll be amazed at the wealth of information packed into these handy books. Excellent for reference—ideal for technical library. Your money back if not satisfied.

**5 BOOKS FOR 50c — 10 BOOKS FOR $1.00**

**SENT TO YOU POSTPAID**

- No. 1—How To Make Four Doerle Short Wave Sets
- No. 2—How to Make The Most Popular All-Wave 1 and 2 Tube Receivers
- No. 3—Alternating Current for Beginners
- No. 4—All About Aerials
- No. 5—Beginners' Radio Dictionary
- No. 6—How To Have Fun With Radio
- No. 7—How To Read Radio Diagrams
- No. 8—Radio for Beginners
- No. 9—Simple Electrical Experiments
- No. 10—Television

Remit by check or money order—register letter if you send cash or stamps.

**RADIO PUBLICATIONS 27-B West Broadway New York (7)**

# *Learn* LANDSCAPE GARDENING

A thorough, interesting constructive home training, covering your regional conditions, for those who wish to become LANDSCAPERS, DESIGNERS, GARDENERS, etc., for profit or pleasure. Write today for FREE INFORMATION without obligation to

**NATIONAL LANDSCAPE INSTITUTE**
**Dept. PS-5, 756 So. Broadway, Los Angeles 14, Cal.**

*Learn Penmanship*

You can learn plain, rapid writing or fancy ornamental writing for social and business advancement, right in your own home during spare time by my Simplified Method. Write for my free book, "How to Become an Expert Penman," which shows what others have accomplished by taking my Courses. Send 10c for one of my favorite Pen Points and your name with a beautiful flourished bird written on a card. Write today.

**T. M. TEVIS, BOX 25R, CHILLICOTHE, MO.**

# "How to Make Money With Simple Cartoons"

**A book everyone who likes to draw should have. It is free; no obligations. Simply address**

**CARTOONISTS' EXCHANGE**

Dept. 1445 Pleasant Hill, Ohio

Correspondence Courses In **RADIO and ELECTRICAL ENGINEERING** **LOW AS $25**

**ELECTRICAL ENGINEERING.** Get good grasp of wide electrical field. Modern. Very understandable. Theory made easy.
**RADIO ENGINEERING.** Extra fine course in radio, public address, photo-electric work. Trains you to be super-service man, real vacuum tube technician. Tuition ONLY $25, either course. Deferred payment plan. Servicemen needed badly.

**FREE** Write for free copies of school catalogs, student magazines, etc.
**LINCOLN ENGINEERING SCHOOL, Box 931-S-89 LINCOLN, NEBR.**

# LAW

STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 37 years expert instruction —over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy payments. Send for FREE BOOK—"Law and Executive Guidance"

**AMERICAN EXTENSION SCHOOL OF LAW**
**Dept. 65-S 646 N. Michigan Ave., Chicago 11, Ill.**

# Become a Doctor of PSYCHOLOGY

Win the degree of Ps.D. Teach the secret of contentment, happiness. Solve mental worries. Experience the revelation of truth. Chartered college. Individual help. Write for FREE book. **COLLEGE OF UNIVERSAL TRUTH, 5153-A North Clark St., Chicago.**

# FENCING

EXCITING FUN HARMLESS

NEW—Clean—Healthful
Develops Strong Body—Alert Mind. Become best swordsman in your neighborhood. FREE BOOKLET *(with foils)* teaches Quickly—Easily. HARMLESS because the 3 ft. Spring Steel Foils (swords) have safety rubber buttons. Complete outfit 2 Steel Foils (swords) and FREE Instructions. Now Only $1.98 postpaid. MAIL CHECK or M. O. today. Add 28c for Foreign Postage.

**LEE PRODUCTS CO., 1613Z-First Ave., New York 28, N.Y.**



Copyrighted material

# *Prepare for* YOUR FUTURE *Now*

**You'll Need "ALL-AROUND" Training to Meet New Conditions!**

**Get Ready QUICK—in 1 of these 2 Opportunity Fields!**

**ELECTRICITY in its Many Branches...** Electricity is a permanent necessity in war or peace. Be ready for the opportunities in such branches as Power Plant Work, Motors, Armature Winding, Industrial and House Wiring, Maintenance, etc., with COYNE shop training.

This big fire-proof building is occupied entirely by the **Coyne** Electrical School.

**RADIO-ELECTRONICS...** A great field now, even greater growth ahead. Prepare for a real Radio career. Learn construction, operation, trouble-shooting on Radio Receivers, Public Address Systems, Sound Picture Units, FM, Photo-Cells, Television—the practical COYNE way.

## "LEARN-BY-DOING"-12 WEEKS TRAINING

## *Student Finance Plan*

Now that peace has returned, many "one-operation" jobs that paid well in war times, no longer exist. Do you have a good job with a real future? Plan for steady pay and advancement by training NOW, while there's still time! Come to the big shops of COYNE in Chicago, for "all-around" training in **Electricity or Radio-Electronics**—the 2 great opportunity fields of today and tomorrow. **I'll finance most of your training.**

## TRAIN ON ACTUAL EQUIPMENT!

My famous **"Learn-by-Doing"** method gives you practical experience on full-size equipment. Not by correspondence, but actual shop work. You are trained right here in the **Coyne** shops, that has been training men and young men for over 46 years.

### START NOW—PAY LATER!

Don't let lack of money hold you back. My "Pay-Tuition-after-Graduation" plan has helped thousands. Coupon brings details. Many earn while learning, to help take care of living expenses while here. Men from 16 up to 40, with or without experience, **Coyne** training is for **you!**

### LIFETIME JOB SERVICE TO COYNE GRADUATES

First I train you for a good job and future, then assist you in getting located. As a **Coyne** graduate, use this service whenever you need it—no charge. Also FREE review privileges at any time. Get the facts!

### INDUSTRIAL ELECTRONICS and Electric Refrigeration

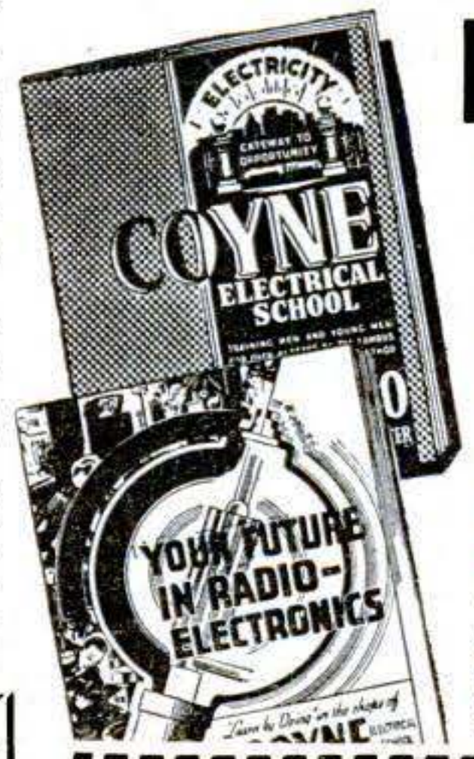
**Included With Either Course—No Extra Charge**

Extra training in these great fields of INDUSTRIAL ELECTRONICS and ELECTRIC-REFRIGERATION makes you more valuable to employer, leads to opportunities for bigger pay. This valuable EXTRA TRAINING included with **either my Electrical or Radio Course,** without extra cost. **We also have facilities for men with physical disabilities whether due to war or other causes. Check coupon for details if you have a physical disability of any kind.**

**VETERANS—** Coyne is also equipped to train those who qualify for training under G. I. Bill of Rights. Check coupon for our Special G. I. Bulletin.

**PICK FIELD YOU LIKE—SEND FOR BIG BOOK**

**FREE**




Some men prefer **Electricity,** others **Radio-Electronics.** Whichever interests you most, we will train you in 12 short weeks at **Coyne**—on full-size equipment, by my famous "Learn-by-Doing" method. I have a big, fully illustrated book on each course, and will send you the one you want, without the slightest cost or obligation. Simply check below, then **mail coupon in envelope or paste on postcard.** No salesman will call. You are the sole judge. Don't delay. Your future is at stake. **Rush coupon to me**—TODAY.

**H. C. LEWIS, Pres.,**
**COYNE ELECTRICAL SCHOOL**
**500 S. Paulina St., Dept. 56-73H, Chicago 12, Ill.**

Send me your BIG FREE BOOK—**for the course checked below.** Also full details of your **"Pay-After-Graduation"** plan.

☐ ELECTRICITY ☐ RADIO-ELECTRONICS
☐ Physical disability ☐ Send special G. I. Bulletin

NAME.....

ADDRESS.....

CITY.....STATE.....

**COYNE ELECTRICAL SCHOOL** H. C. LEWIS, Pres. Founded 1899

**500 So. Paulina Street, Dept. 56-73H, CHICAGO 12, ILL.**



Copyrighted material

AS LITTLE AS $100 starts you in business for yourself

## Start Right Out *Making Money*

Make photoexact copies of important papers, letters, drawings, photos, veterans' discharges, etc.—for local firms, lawyers, real estate men, accountants, advertising men, engineers, others. *Every business* is your prospect for error-proof, low-cost photocopies. New, amazingly simple method requires no lens, darkroom or training. For only $100 you own your own business—with APECO, "America's Most Widely Used Photocopy Equipment." Easy to start . . . many prospects . . . quick results . . . pleasant work. A real money-making opportunity, good for a lifetime!

**Get Full Information! MAIL COUPON NOW**

**AMERICAN PHOTOCOPY EQUIPMENT CO.**
2849 N. Clark St., Dept. HU56, Chicago 14, Ill.

Please send me your illustrated book and details about the APECO business opportunity.

NAME.....

STREET.....

CITY & STATE.....

# *Learn* REFRIGERATION and AIR-CONDITIONING

## *ARE YOU HANDY WITH TOOLS?*

Exceptional opportunity for men of all ages up to 60. The demand for repair and service mechanics in both REFRIGERATION and AIR-CONDITIONING is acute and will continue. You can easily and quickly—

## *Learn to Be a Service Mechanic at Home or in Our Shops*

Our practical, thorough course is easy to grasp and can be studied at home in your spare hours. No previous experience is needed. A common school education is enough. Learn how to start your own business with $50.00 worth of tools in garage or basement. Open up your own shop or take a well paid job in this active field.

**START YOUR OWN REPAIR SHOP**

Write for free booklet today. No obligation whatever.

**MAIL COUPON TODAY**

**Send for FREE BOOKLET!**

**Mechanics Training School**
**7217 So. Broadway, Dept. S-5, Los Angeles 3, Calif.**

**Dear Sirs: Please send me, without obligation, your free catalog and full details.**

*Name* _____

*Address* _____

*City* _____ *State* _____

# Study ACCOUNTING

## NOW—*For Top-Pay Career*

Fewer have trained for Accounting in recent years. Yet government regulations and taxes demand more bookkeepers and accountants. Good opportunity now to enter this growing, well-paying field. After short period of spare-time training, you can take accounting position and continue study on the job. Interesting, free 48-page booklet describes opportunities and requirements in Accounting and tells how you can prepare quickly and at moderate cost. Write for "Accountancy, The Profession That Pays."

**LASALLE EXTENSION UNIVERSITY**
***A Correspondence Institution***
**417 S. Dearborn St., Dept. 583-H Chicago 5, Ill.**

# ELECTRICAL TRAINING

Intensive 8 months residence course in fundamentals of industrial electrical engineering, including radio, electronics. Prepares for technician, engineering aides. Approved for veteran training. 53rd year. Write for catalog.

**BLISS ELECTRICAL SCHOOL**
**7608 Takoma Ave., Wash. 12, D.C.**

**WONDERFUL INVENTION**—Corrects poor penmanship in few hours. Guaranteed. Helps one get better job. Increases prestige. Write Ozment, 35-B, St. Louis, Mo.

## Learn CARTOONING

**FOR PLEASURE & PROFIT.** New, crisp, snappy, that's the description for this amazing portfolio of Cartoons. Illustrated charts make cartooning easy, pleasant, & interesting. Complete portfolio of charts, ONLY $1.00 postpaid.

*For FREE DETAILS send name & address.*

**STUDIO OF CARTOONING, Box 23 Lefferts Sta., Dept. B5, Brooklyn 25, N. Y.**

# ARTISTS MAKE MONEY

Do you like to draw? Send name, address, age and occupation for FREE ART TEST, to find out your ability.

**ART INSTRUCTION, INC.**
**5146 Art Instruction Bldg., Minneapolis 15, Minn.**

## Learn Profitable Profession in 90 days at Home

**MEN AND WOMEN, 18 TO 50**—Many Swedish Massage graduates make $50, $75 or even more per week. Large full time incomes from doctors, hospitals, sanatoriums, clubs or private practice. Others make good money in spare time. You can win independence and prepare for future security by training at home and qualifying for Diploma Anatomy Charts and 32-page Illustrated Book FREE—Now! **THE College of Swedish Massage, Dpt. 670E, 100 E. Ohio St., Chicago 11, Ill.**

# MONEY for MEN ALL DATA FREE

THE PLASTEX Industry needs manufacturers on small scale and for big production of Lamp and Clock Stands, Art Goods and Novelties in Plastex and Marble imitation. Experience unnecessary. ½c material makes regular 10c store sellers. Rubber moulds furnished for speed production. Small investment brings good returns. Big chain store orders now being placed. Ambitious men have chance for real prosperity. Our Free booklet will interest and benefit you.

**PLASTEX INDUSTRIES, Dept. 2, 1085 Washington Av., New York 56, N.Y.**



Copyrighted material

## Get Ready for Big After War Opportunities!

**I Will Train You at Home Until You Get a GOOD PAY JOB in**

# DRAFTING

Act now to get a better job with more pay and pleasant working conditions. Get into Drafting—the basic profession where all post war products will start. I will train you at home—give you experience—doing the same kind of jobs you will do with the best paying firms. I furnish instruments, drawing table and all equipment when you start. Write today for vital facts and FREE illustrated book. Give Age.

**Engineer Dobe, Div. 25, Libertyville, Ill.**

---

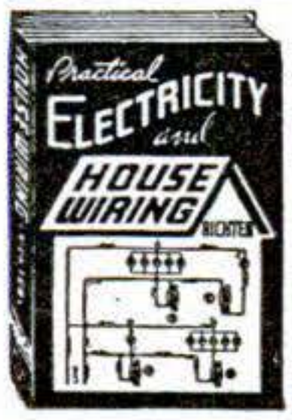
## MAKE MONEY CASTING AT HOME

*•• FREE FACTS SENT ••*

Make hundreds of Plaster Casts, quick, easy. Sell output to stores, novelty shops, etc. Enormous profits. No experience. Very little capital needed. Start in basement, garage or workshop. Complete, simple instructions anyone can follow. Start now while merchants are begging for merchandise to sell. Rush.

**PLASTIC ARTS STUDIOS, R. R. 5, Dept. 45, Muncie, Ind.**

---




## Practical Electricity and House Wiring

Discusses common electrical devices, principles of circuits, wires and insulation, grounding, fuses and circuits, wiring methods, planning installations, installing switches, fixtures, etc., wiring houses after they are built, alterations and additions, wiring farm buildings, home repair, etc. 200 pp.....227 illust.

C.O.D. $2.00 **Send Today, Money Back Guarantee** Postpaid $2.00

**GATEWAY BOOK COMPANY, Dept. PS-17**
**32 N. State Chicago 2, Ill.**

---

## GET INTO REFRIGERATION AND AIR-CONDITIONING

Build your future in fast-growing industry. Prepare for high pay jobs or *get into your own business.* Resident classes only.

Send ad with name and address for information.

VETERANS
Eligible for training under G. I. Bill, *Check here* ☐

Dept. S-5

**BOSTON TECHNICAL INSTITUTE**
*School of Refrigeration,* 4707 Euclid Ave., Cleveland 3, Ohio

---

## *Now You Can Lick ANY* AUTO REPAIR JOB!

Look up make, model, job in MoToR's AUTO REPAIR MANUAL—and go to work! Complete guide for every model built since 1935. 764 pages; 1000 illustrations; 450 charts; 200,000 repair facts. Index. After 7 days' **Free Examination,** send $1; then $1 monthly for 4 months, 35c postage. If not satisfied, return book, pay nothing. **MoToR Book Dept., Desk 2E, 572 Madison Ave., New York 22, N. Y.**

---

## LEARN MASTER MACHINIST MECHANICAL DRAFTING

Expert training on Lathes, Milling Machines, Shapers, Grinders, etc.—Mechanical Drafting, Blueprint Reading and Designing. Allied shops are completely equipped and modern. Approved for G. I. Training • Days, Evenings

**ALLIED SCHOOL OF MECHANICAL TRADES**
**1332 South Michigan Avenue • Chicago 5, Illinois**

---

## STAMMER?

This new 128-page book, "Stammering, Its Cause and Correction," describes the Bogue Unit Method for scientific correction of stammering and stuttering—successful for 45 years. **Benj. N. Bogue, Dept. 1885, Circle Tower, Indianapolis 4, Ind.**

GET THIS FREE BOOK!

---

## *Learn* MECHANICAL DENTISTRY

**A profession offering unlimited opportunities.** Most modern and complete course embracing every branch from Plate to Porcelain Work, which prepares you to work for Dentists or start your own business. Individual instruction—practical training in day or night school. No books—no classes. Catalog upon request.

**McCARRIE SCHOOL OF MECHANICAL DENTISTRY**
**207 N. Broad St. Dept. 850 Philadelphia, Pa.**

---

## LEARN MEAT CUTTING At Home—In Spare Time

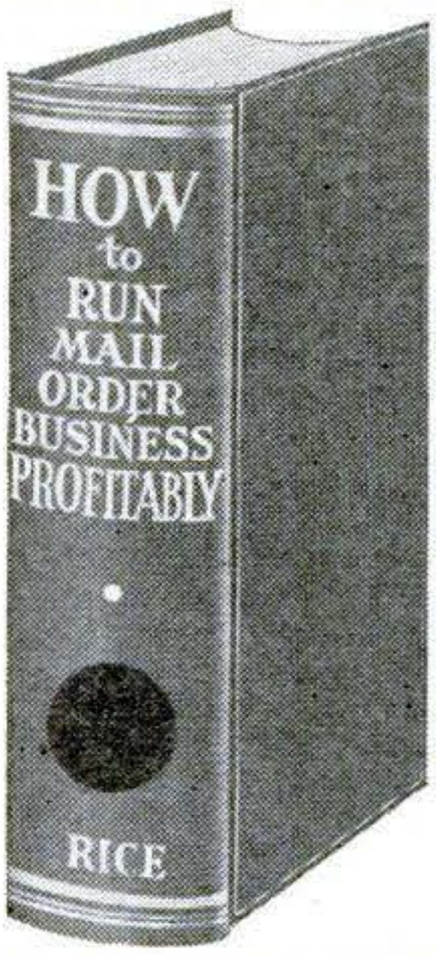
Get into the vital meat industry. Concise, practical Home Training based on 25 years proven instruction methods used at National's famous resident school. Prepares you for bigger pay as Meat Cutter, supervision, market manager or more money in your own store. Go as rapidly as your spare time permits. Diploma. Start NOW to turn your spare hours into money. Send for FREE bulletin today. No obligation.

**National School of Meat Cutting Inc., Dept. O-42, Toledo 4, O.**

---

# How to Make Money by Mail

**Down-to-earth** facts, directions *(illustrated)* for running business **profitably,** using expertly for **YOUR** good fortune the employees, trains, planes which Gov't places at your disposal **CHEAP.** Get orders by mail, ship by express or freight or mail, **get out of** the **kindergarten** . . . 14th edition, **enlarged** to 576 pages, now selling. It's **YOUR** winner. **Make this year and the following years worth more. . . . . THIS** knowledge really **PAYS OFF.**




## THE EASY WAY to start new or expand your present occupation. Do it NOW.

Extraordinary plain, simple skill, know-how. **No theory.** Fact story of rich experience of author E. Rice day-by-day. How many times have we heard: **"I wish I had some money, this patent would earn me a fortune,"** or **"why can't my crop pay better?"** or **"I wish I knew how to sell this gadget myself,"** or **"why should my boss alone do this when I too know how the money is made? . . . Listen, you do not need money** to start this Rice way. His method **automatically** pays all bills same day rendered, no bank loans, pay as you go, no borrowing from relatives or friends, no salesmen. Also no worry, quickly a home of your own all paid for. **Rice paid off $5000 in mortgages a year after using this skillful idea.**

## 45 Years of PROOF

**Sounds fishy?** Sure but this has been done steadily for **45 years,** depression or no depression, by the author; that is why he wrote this book, to pass the good word along. **Make it go with anything you have** which is salable, or with what you are **now** doing. Rice made his pay plan go from the start when living in one room in a city lodging house. **Turn your city or country home,** your work, your hobby, into money. How to get orders coming steadily at cost of **only $4 for each $100** taken in. The popular error to avoid in trying for sales. Business won **free** while others have to pay for it. How to conceive the money-getting advertisement . . . Profitable changes from ordinary ideas and methods. Not usual cut-and-dried pattern. 165 adventures, a dictated book **in everyday talk** by Rice **doing day by day what he discloses in his book can be done by his method.** No dictionary writing. . . . Read how others are profiting big. **Take a chance** on this book being worth a fortune to you and yours and send **$2.95.** Book mailed same day order is received. Or ask two friends to chip in **98** cents each with your **99c** to get this book. Hundreds of buyers whose letters we show you declare **emphatically** its superlative goodness. Follow its easy pattern for **success.** Cloth bound, **576** pages, 8½ by 5½. **Best seller.** 14th edition now selling. Cut out the **$2.95 HOW BOX** here, pin or stick it to sheet of paper bearing your name and address, mail in envelope with money order or check for **$2.95** to

**HOW $2.95**

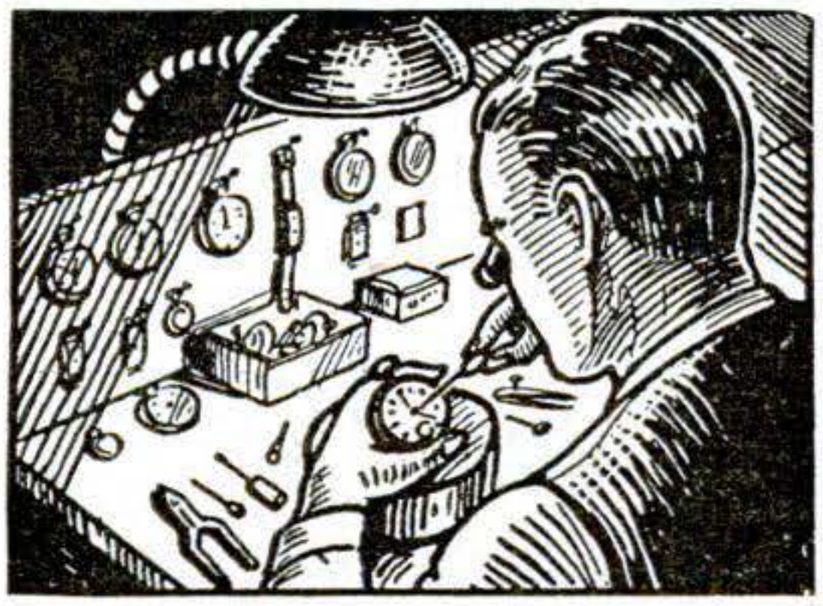
**HOWARD ST. HOUSE, Melrose 76E, Massachusetts**

---

## Say You Saw It In POPULAR SCIENCE

---

## *Learn* WATCH REPAIRING



***In Your Spare Time At Home***

## EARN WHILE LEARNING

Now—with the manufacture of watches scheduled for enormous production to meet big demand—the need for watch repairmen will be greater than ever before. Our practical Home Training Course prepares men and women for a big-pay profession. Be the ace Watch Repairman in your territory. Write TODAY for details.

**FREE WATCH** working tools and watch included as part of our Watch Repairing Course.

**ILLINOIS SCHOOL OF WATCH REPAIRING**
**6312 Huntington Street, Dept. PS-5, Chicago 30, Illinois**

Copyrighted material

# LANGUAGE IS POWER

. . . Forge ahead, win special assignments, promotion, better job in global peace time opportunities through ability to speak a foreign language.

*Speak*

FRENCH
RUSSIAN
GERMAN
ITALIAN
SPANISH
PORTUGUESE

***or any of 23 other languages by the***

## LINGUAPHONE METHOD

***The World's Most Approved Language Courses***

It's all talk; natural every-day conversation. *In your own home* you can learn to speak any of 29 languages by the world-famous Linguaphone Ear-Eye Conversational Method. It is amazingly simple and practical. You HEAR voices of native teachers . . . they speak to you as often as you want them, never tiring . . . you REPEAT what they say, answer their questions . . . before you are actually aware, you are conversing in a foreign language.

Learn alone, or have the family or friends join you in a delightful pastime that pays dividends.

Save time, work and money, learn the Linguaphone Way which has helped thousands in the Army, Navy, Flying, Signal Corps and other services, as well as more than 1 million home-study students.

**FREE**—Get the facts about this time and money saving way to learn languages—send for the FREE illustrated Linguaphone Book.

## LINGUAPHONE INSTITUTE

**47 RCA Building, New York 20, New York**

LINGUAPHONE INSTITUTE
47 RCA Bldg., New York 20, N.Y.
Send me the FREE Linguaphone Book.

Name .....

Address..... City.....

Language Interested.....

**Say You Saw It In Popular Science**

## RADIO, ELECTRONICS and YOU!

THERE are big rewards in the communications line for the Radio man who has the answers! Too, the equipment that has made Radio communication possible is functioning now in other rewarding fields. Electron tubes in industry promise a whole new World of Electronics. I. C. S. has a variety of Radio Courses and a great new standard Electronics Course. Write for booklet, pick *your* Course.

**INTERNATIONAL CORRESPONDENCE SCHOOLS**
**BOX 7659-L, SCRANTON 9, PENNA.**
Send me full information on the following subject:

.....

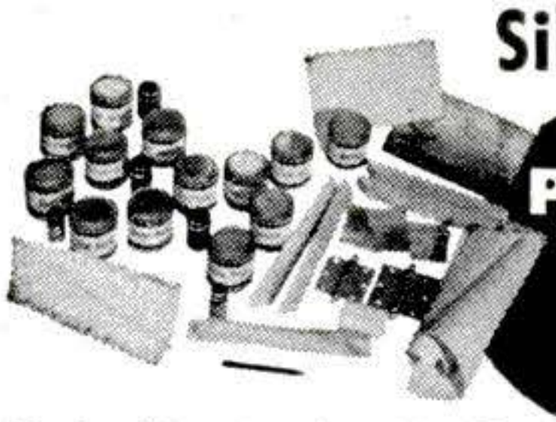
*Name*.....*Age*.....

*Home Address*.....

*City*.....*State*.....

*Present Position*.....*Working Hours*.....*A.M. to*.....*P.M.*

## Silk Screen Process



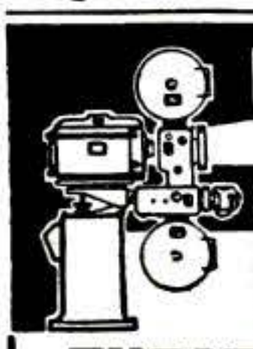
**A PROFITABLE BUSINESS OF YOUR OWN**

We Send You Complete Kit of Supplies

***Practice in Your Spare Time***

**A HIGH PROFIT BUSINESS, OR A THRILLING HOBBY**

Silk Screen Processed signs and displays needed everywhere. A lucrative future for you in the great advertising boom. Easy to do—quick to learn—you may make more than course costs before it's completed . . . ***BOOKLET*** with 3-color Silk Screen Processed Cover and samples sent ***FREE*** . . . Write now, California School Screen Process, Dept. PSD-546, 2710 So. Spaulding, Los Angeles 16, Calif.



## LEARN MOVIE PROJECTION

**THEATRE MANAGEMENT**

The Motion Picture Theater Business offers big opportunities for trained men. Get into a fascinating field with a post-war future. Train at home in spare time. Free Catalog. Established 18 years.

**THEATRE INSTITUTE** 385 Washington St., Elmira, New York

***Act Quick*** Get ready for Real Estate boom ahead. Big pay job or own business. Fortunes will be made. Get facts. Information free. Write Weaver (former Federal Land Bank Appraiser) 1200 Oak, K. C., Mo. Dept. A-2. Est. 1936.

## *War Surplus GAS MASKS*

***GREATEST TOY SENSATION IN YEARS***

Loads of fun! Cost U. S. Gov't. $2.50. Fine war relic—great toy—also useful for spraying paint, insecticides, etc. Big plastic shatterproof goggles makes you look like man from Mars. All brand new! Adjustable head size. Canvas shoulder strap bag included. Satisfaction guaranteed. Order now.

**$1** POST PAID

**STARK'S—Dept. G5**
**509 S. State Chicago 5, Illinois**

## BOOKS FOUND FREE!

**WHAT BOOKS DO YOU WANT?**

We quote the lowest market prices. No charge for locating Hard-to-Find and Out-of-Print Books. All books, OLD or NEW, mailed POST-FREE.

**SEARCHLIGHT BOOK CENTRE**
**22 East 17th Street New York City**

## LEARN PORTRAIT PAINTING AT HOME

• Previous art training or talent NOT necessary. This new Stuart System teaches you, in 11 simple, easy-to-follow lessons, to make *exact* charcoal and oil likenesses. Guidance for your every step. Send for free book *today*.

**STUART STUDIOS, Room 285**
**121 Monument Circle Indianapolis 9, Ind.**
Please send me free book and outline of lessons.

*Name* _____

*Street* _____

*City* _____ *State* _____

Copyrighted material

# POPULAR SCIENCE Classified Opportunities

*Save time—Save Money*

**Classified Ads only 50c per word per insertion, payable in advance. Minimum ad 10 words. To be included in June issue copy should be in our office by May 1st. June issue on sale June 1st.**

**POPULAR SCIENCE MONTHLY—351 FOURTH AVE.—NEW YORK CITY 10**

## 1 ADVICE

DRUNKENNESS Is a disease which responds to treatment. Medical skill plus human sympathy prove successful with liquor and drug cases. 60 years experience. Write for free booklet. P. S. Nelson, The Keeley Institute, Dwight, Ill.

INTELLIGENCE Test, correction, analysis, complete $1.00. Rutherford Preparatory School, Box 347, Long Beach 1, Calif.

PERSONAL Adviser—Confidential, domestic, marital, educational, religious, general; by professionally trained, B.S., M.A., M.Ed., none less than $3.00, none more. Box 114, Gap, Pa.

ADVICE domestic, personal problems. Confidential. Send dollar. Personal Consultant, 420 Second Ave., Leavenworth, Kansas.

TO The Sick: "Vitascience"—Drugless healing through the spoken word. Speak your ills away. Write for free details. Cedric S. Moore, 1313 S. Union, Kokomo, Indiana.

UNLIMITED Opportunities Ahead! "How to Get a Better Job" may help your postwar planning. Information free. Joseph Weber, 5652 So. Francisco, Chicago 29, Ill.

## 2 ADVERTISING

ADVERTISE 24 words. 40 Newspapers $3.50. List Free. Advertising Bureau, 4515-P Cottage Grove, Chicago 15.

ADVERTISE Profitably: $20.00 reaches 5,000,000 Sunday newspaper readers with 24-word ad. Newspaper, magazine, mailing-list ratebook free. Chicago Advertising Agency, 20-PS West Jackson, Chicago 4.

"HOW To Write Advertising," absolutely free! Dudley Bunn, 126-PS Lexington Ave., New York 16.

40 WORDS Display 14,000 Readers 50 magazines, your name as publisher $2.00. Renick, Holland, New York.

24 WORDS in 64 Weeklies $4.96. J. Darnell, 730 Hays, Jackson, Tenn.

GET—Advertising Tips on selling by mail. Contains Valuable information, on mail order business, Price $1.00. A. H. Allen, 2335 Arapahoe St., Denver 5, Colorado.

ADVERTISING Service—For men going in business. Put our experience in merchandising and advertising back of your products. Write Van De Mark, 1107 Times Star Bldg., Cincinnati 2.

INCH Display Advertisement Fifty Magazines, Year $24. Wood's Popular Services, Atlantic City, N. J.

## 5 AGENTS WANTED

LICK After-war layoffs; Start own business; home, office. Booklet describing "Collection of 127 Tested Plans" free. Elite Co., 220 Grand St., New York.

GOOD Paying Business Silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late method. No tanks or shop required, outfit furnished. Free Booklet. Gunmetal Co., Ave. G, Decatur, Illinois.

EXCELLENT Sideline for Printing Salesmen. Decalcomania Name Plates in small quantities. Also, make money applying Initials on Automobiles. Free Samples. "Ralco", X-164, Boston (18), Mass.

FREE Water and our concentrates makes flavors, lotions, shampoos. 72 products, labels, bottles furnished. Qualco. F-20030 Russell, Detroit.

FREE! Latest issue Opportunity Magazine. Salesman's Guide. Inspiring, constructive. Shows how to earn money selling for others or in your own business. Hundreds postwar opportunities. Send name and describe what you have sold or are selling. Illustrated copy sent Free. Opportunity Magazine, 620 N. Michigan, Dept. 18, Chicago 11, Ill.

BIG profits taking subscriptions for all magazines. Agents' Confidential Catalog listing over 2500 periodicals and complete starting supplies Free. Pines Subscription Agency, Flushing, New York.

WAR Honor Scroll. All branches of service represented. 12 by 16. Space provided for name and photograph. Truly beautiful. Agents make big money. Sample 25c. E. Condon, Dept. 9, Upper Darby, Pa.

90c PROFIT each $1 sale. Sell permanent mothproofing solution to housewives, stores, agents. Experience unnecessary. Postal brings details. Kinford, Wayne 4, Penna.

MAGIC cleaner and laundry soap deal. Hotter than a firecracker. Big profits. Sample Free. Uco, 5007 Irving Park, Chicago.

NEW year 'round extra money plan. Show friends exclusive greeting card assortments. Up to 100% profit. Request all Occasion $1.00 assortment on approval. Also show Birthdays, Social Notes, Gift Wrappings. Free sample Personalized Stationery. Thomas Terry Studios, 139 Union Ave., Westfield, Mass.

JUST Out! History of World War II. Huge volume. Popular price. Authentic text. Official Photographs. Big profits. Riverside Book Co., Iowa Falls, Ia.

START Your Own Business on our capital. Always your own boss. Hundreds average $6,000 to $25,000 annual sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world wide Industry. Write Rawleigh Co., Dept. E-U-PSC, Freeport, Ill.

ELECTRIC ironing Cords with indicator light. Iron-So-Ezee Co., Mt. Washington 30, Ohio.

SELL Greeting Cards, Display Signs, Pictures, Books, Novelties. Big Profits. Bulletin Free. Elfco, 432 North Wells, Chicago 10.

AMAZING New Zipper Shoe sells on sight. Big profits for salesmen. Leads line 200 splendid styles. Territories open. Get Free Sample Outfit. Write Mason Shoe, Dept. M-338, Chippewa Falls, Wis.

PLEASANT, profitable year 'round sideline. No capital needed. Helps Furnished. Opportunities unlimited. Liberal commissions. Mail penny card for Free Wholesale Price List Today! McGregor Magazine Agency, Dept. PS-6, Mount Morris, Ill.

COSTS 4c, Sells 25c Immediate Demand. Big Repeater, Hose Preservative, Sample 25c. Details Free. Lyle Products, 5 E. Spaulding, Willoughby, Ohio.

GOLD Lacquered Window Sign Letters. New Foils—Styles—Absolutely Beautiful. Free Samples. Atlas, 7941 Halsted, Chicago.

FINKLE knows mailorder advertising! Nationally known writer guarantees powerful letters, literature, selling campaigns. Big, positive results! Postcards ignored. Finkle Advertising, 1201½ South Ogden, Los Angeles, 35, Cal.

FREE New 42-page book entitled "How To Become A Successful Direct Salesman", written by salesmen for those who want to become salesmen and earn up to $100 and more weekly. Send penny postcard. Specialty Salesman Magazine, Dept. PS, 307 N. Michigan, Chicago 1, Ill.

FASCINATING year 'round income building plan. Take easy orders from friends, fellow workers, church organizations for 10 fast selling greeting card assortments. Sell for $1.00 each—cost you 50c up. Extra bonus. Experience unnecessary. Request foremost $1.00. All Occasion box on approval, free Correspondence Notes samples. Special Offer. Bluebird Studios, Dept. 17-G, Fitchburg, Mass.

SELL "Petite Picture Notes." Something really different in greeting cards. Sample free. Dunbar Cards, New Brunswick 21, N.J.

SELL Greeting Cards. Box 61, Times Square Station, New York.

$1 STARTS you in business. Sell DeLuxe five fold ties. 100% wool interlining. Costs you only $7 per dozen, you make $5 dozen. Send $1.00 for special introductory offer two five fold ties. Catalog complete line Free. Philip's Neckwear, 20 W. 22nd St., Dept. P-2, New York 10.

SELL Greeting Cards. Easy Money showing gorgeous All Occasion, Birthday, Religious, Humorous Box assortments. Wrappings, Stationery, Correspondence Notes. Special Offers. Experience unnecessary. Quick service. Request $1.00 Everyday assortment on approval. Hedenkamp, 343 Broadway, Dept. PS5, New York 13, N. Y.

WE pay you $25 for selling fifty $1.00 assortments Birthday, All Occasion cards. Tremendous demand. Sell for $1.00—your profit 50c. It costs nothing to try. Write for samples. Cheerful Card Co., 145, White Plains, N. Y.

BLACKLITE Experimental Kits—Five Colors Fluorescent Lacquer and Ultra Violet Lamp all for Five dollars. Keese Engineering Co., 7354 Santa Monica Blvd., Hollywood 46, Calif.

SELL Social Security Identification Plates and Wallets, name and account number stamped on beautiful brass plate, sample 35c. John Galvin, 5932 N. Lawrence St., Phila. 20, Pa.

BUILD Year Round Lifetime Business, sell everyday necessities to stores, institutions, industrial plants, homes, etc. Easy repeats. Excellent profits. Great cooperation. Become territory distributor. Investigate. Lytle Supply Co., Ave. 12, Fredericksburg, Ohio.



Copyrighted material

BLOTTER Calendars—Free samples—Write Art Calendar Co., 2020 Griffith St., Philadelphia 15, Pa.

SELL individualized belts, buckles, cap badges, emblems, tie holders. Over thousand emblems to choose. Every veteran prospective customer. Fast profits. Repeat business. Write today special outfit offer. Hook-Fast Specialties, Box 1425, Providence, Rhode Island.

BIG Commissions—selling to stores celluloid Pricing Tickets, metal shelf molding. To restaurants, menu covers, signs. C. Pricing Press, 124 White St., New York 13, N. Y.

FAMOUS Picture—four colors, 500,000 sold. Permanent opportunity. State experience. Sample print Free. Our Flag Sales Corp., Dept. C-1064, Excelsior Springs, Mo.

TOPS For Getting Extra Money. Quality line beautiful Greeting Cards for all occasions. Liberal profits. Ufert Co., 16 E. 17th St., New York 3, N. Y.

BALLOONS . . Toys! Sell Like Nylons . . Everywhere!! The Kiddies Go Wild!!! $9.50 Gr. Sample 15c. Noveline Enterprises, 790 Broad, Newark 2, N. J.

IMMEDIATE Profits! Take orders for our new amazingly beautiful lifetime laminated Plastic Reproductions of any snapshot or negative. Truly a miracle of modern scientific achievement. A genuine opportunity to build an interesting, profitable, business without investment. Write now for details. Gotham Products Co., 215 E. 149th St., New York 51, N. Y.

SILVER Plating Liquid. Simply Rub-On with a cloth. Cleans, Silverplates, Polishes, one rubbing. Puts on genuine 1000 Fine silverplate. Renews silverplated ware like new. Silver-plates onto brass, copper, bronze, etc. Lasting finish, won't come off. Sales representatives wanted. Details free. NuProcess Products, Dept. 222, Aurora, Ill.

$3 FIRE Extinguisher sells wholesale or direct. "Fire Killer", Zone 1, Syracuse, New York.

EASY Profitable Sales, Consumer, Retailer, Inexpensive Fire Extinguisher. Fi-Rout, Box 1154, Paterson, N. J.

200 MONEY Making Ideas, Plans, Rare Formulas, Schemes. Folio Free. Formico Co., Box 572, Dayton, Ohio.

POWERFUL Mile Stretcher! Increases mileage-power, your Bank-Account. Sales easy, profitable. Thermopower, Peoria 4, Ill.

ENORMOUS Profits, Big Sellers, History World War II, Bibles, J. Henry Schlake, B127 East Third, Cincinnati 2, Ohio.

DEMONSTRATING embossem transforms handwriting into gold, silver raised lettering for cards, stationery $150.00 a day possible. Cost 5c sells $1.00. Sample writing 10c Embossem 50c. Western Chemical, Salem, Oregon.

GOLD Veterans Scroll. Retails $1.00—Costs 15c Sample Free. Levine's, Box 15-A, Boulevard Station, New York 59, N. Y.

NEW Sensation! Beautiful Perfume Dispenser! Sample, 60c Rosole, 2015—74th Street, Brooklyn 4, N. Y.

WONDER Silver Plating Liquid. Applied with cloth. Deposits permanent silverplate on all silverware, brass, bronze, zinc etc. Good carded item for stores. Wonderful demonstration. Big Profits. Full details by mail. Wonder Products, 1265A Broadway, New York 1, N. Y.

SELL Fomo-clean, rug, upholstery cleaner steady sales. Big profits write, Gansler Specialties, Bridgeport 12, Ohio.

POWER Mower—Sensation. User agents wanted. Farm Products, M-20 15, Excelsior Springs, Mo.

WOULD you pay 3%—first $350 made? Color-illustrated book "505 Odd, Successful Enterprises" free! Proven by "Little Fellows." Start at home, office. Expect something Odd! Pacific, 262-G Drake, New Rochelle, N. Y.

## 6 AIR CONDITIONING & HEATING

DEALERS and Installation men to sell and install gas conversion burners. Large profits. Peerless 4320, Sheridan, Lincoln 6, Nebr.

ELIMINATE down draft. Keep the Chimney dry. Saves fuel. See page 136 for description. Chimney Umbrella, 1012 Washington St., Hoboken, New Jersey.

## 7 AMERICAN POLICE JIU JITSU

DEADLY Judo-Fiercest Fighting Technique. Jitsu, Wrestling, Foot-Fighting, Police tactics. Complete course (186 Photographs). Special $1.00. Variety House, Box 46-AC, Wall Station, N.Y.C.

## 8 ANTIQUES, RELICS, INDIAN GOODS

SWORDS, rapiers, daggers, pistols, armo: illustrated catalog. 50c. Robert Abels, 860½ Lexington Ave., N. Y.

440 ANTIQUE Firearms:—5,000 Bargains: —Coins, Indian Relics, Cartridges, Minerals, Rifles, Swords, Fossils, Flintlocks Carbines,—Catalog with photographs 25c. Heike, Wenona, Ill.

4 FINE perfect Ancient Arrowheads $1.00. 4 perfect tiny bird arrowheads. $1.00. List Free. Lear's, Box 569, Galveston, Texas.

## 9 ASTROLOGY

COMPLETE Astrological Horoscope send daily for one year—$2.00 (bills). B. Morgan, M.A., 8801 Grand River, Detroit 4, Mich.

FREE! 3 Questions Answered with Solar Horoscope. Send birthdate 25c. Professor Golliday, L-1514 Long, Columbus, Ohio.

## 10 AUTHORS SERVICE

I WANT New Writers to cash hundreds of checks for $1 to $100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for Free details. No obligation. Saunders M. Cummings, Box 609-S, Colorado Springs, Colo.

HOW To Write and Where To Sell Short Stories. Instructions with surprise gift $1.00. Writer's Service, PS-1514 Long, Columbus, Ohio.

## 11 ARCH SUPPORTS

BIG Profits Manufacture custom arch supports. Julis Corssen, 2638 Geyer, St. Louis 4, Mo.

## 12 AUTOMOBILES

RACING Car performance for all cars. Increase power, speed, pick-up. Special "Custom-built" equipment. Write Lee Motorcraft, 1412-B Great Northern Bldg., Chicago 4, Ill.

AUTOCAR, English Automobile Magazine. Interesting advertisements, articles on foreign cars. Sample copy 50c postpaid. Clymer, Dept. B54, 2125 W. Pico, Los Angeles 6, Calif.

AUTOMOBILE Racing Book. Fifth Edition —Revised. Tells how to build dirt track bodies, frames, engines. Records, superchargers, rules, formula, plans, stock conversions, roadster racing, fast Fords. $1.00 postpaid; $1.15 C.O.D. Ray Kuns, Department 274, Madisonville, Cincinnati, Ohio.

SEE our ad under Motorcycles for midget car bargains. Midget Motors Directory, Athens, Ohio.

FREE List Photos race cars with drivers. Frank Smith, Midland Park, N. J.

CUSTOMIZE your automobile. Illustrated new restyling ideas, instructions, specific model changes by simple methods, $1. Speedwheel, Box 723-C, Arcadia, California.

JET impulsion now for Automobiles. Rush name. Free literature. Wayne Engineering, Greenville 2, Ohio.

FLOYD CLYMER'S Popular Automobile Books: Motor History of America, complete authentic book American automobile development $3.00 Motor Racing With Mercedes-Benz, complete Europe Grand Prix Racing Book $2.00 Ab Jenkins World's Record Book $1.50 Sir Malcolm Campbell's World's Speed History Book $2.00 Modern Steam Automobiles Background $2.00 Power and Speed, wonderful book $2.50 Sample copy English Autocar 50c. All books Postpaid. See our advertisement under Motorcycles. Clymer, Dept. B51, 2125 W. Pico, Los Angeles 6, Calif.

BUILD speedy Midget track racer from castoff parts! Plans, specifications, construction information, $1.00. Motor Supply, Box 1682-CS, Toledo, Ohio.

SENTINEL Steam Truck, Stanley Steamers, Parts. Circulars free. Steam Car Assoc., 529 66th St., Oakland, Calif.

FLEET operators, auto owners all maintenance personnel. The situation is still critical, new trucks and cars may be a long way off. Systematic Automotive Maintenance is the answer, simplified, excellent coverage, save money, prevent accidents $1.00. Bureau of Systematic Maintenance, Box 356, Eau Claire, Wis.

DUALTONE custom built twin muffler sets, for Fords and Mercurys. Eliminates back pressure giving increased gas mileage and horsepower. Designed for deep mellow tones. Instructions included. $20.00. Dualtone Mufflers, 2636B India St., San Diego 1, Calif.

"500 MILE" Indianapolis Automobile Racing History Book, just printed. Complete history detailed year by year results every Indianapolis race since 1909. 320 large pages, over 2000 illustrations, drawings, photographs describe foreign, American racing automobiles. Photographs world's famous drivers. View in your arm chair every mile of every event at 10c a race average cost. Complete book Postpaid $3.50. De Luxe Edition bound attractive red Du Pont Fabrikoid $5.00. Limited number available hurry! Clymer, Dept. B52, 2125 W. Pico, Los Angeles 6, Calif.

## 13 AUTO SUPPLIES & EQUIPMENT

HAVING Car Trouble? New, Used, guaranteed auto, truck parts save money. Transmission specialists. Describe needs; immediate reply. Victory, 2930¼ No. Western, Chicago 18.

1000 MOTORISTS Needed to make gas saving test. Up to 30% savings. For trial test offer write Vacu-matic Carburetor Co., 7617-1274 W. State St., Wauwatosa, Wis.

LOREMAN Spark Plugs. Top quality, 75c value. State make, year, model, number of cylinders. Sets of 4 or more only 59c each. Check or money order. Loreman Auto Products, Salisbury, Md.

CARBURETOR repair kits containing all the essential parts for completely rebuilding a specific carburetor. Over 400 kits available. Carburetor Service, 600-B LaPrairie, Ferndale 20, Mich.

PRE-WAR truck tubes most without repairs. All sizes at O.P.A. ceiling. Money-back guarantee. Tire Shop, 120 Orange Ave., Suffern, New York.

BUG Screens:—For Car, Truck or Tractor. Prewar Made. Highest Quality. State Make, Year Model. $1.25 value. 50c each. Postpaid. Allen Co., Clinton, Mo.

AIR Compressor outfits, complete with quart size spray guns, less motors. Use your own ¼ Horse Power Motor. Limited Quantity. Write for details. Box 172, North End Station, Detroit 2, Michigan.

MUFFLER manual. Convert easily to Hollywood, Laguna, Westwood, duals, etc. Includes construction details, regulations, diagrams. Postpaid $1. Mellotone, Box 723C, Arcadia, Calif.

NO More Worries about flat Tires! Ernie Airline Tire Inflator! $1.00. Super Scissors Auto Jack! $6.50. Brake Bleeder Hose! 25c. All three items delivered for $6.50. Money Back Guarantee. Distributors Wanted, write for Free details. Kramer Industries, PS3145, Euclid 17, Ohio.

SPARK plug specialist, spark plug operating temperatures range from 900 to 2000 degrees. Exact plug makes tremendous difference in performance and cost of operation. Plugs for any engine, state make, year, model, type of fuel used, and thread size. 59 cents each, lots of ten, 45 cents prepaid. Impossible to buy better plugs, quality unsurpassed. Absolute satisfaction guaranteed or money refunded. Send money order to Sparky, Box 1522, Jackson, Miss.

OIL Pumping Motors—Brought Back to Normal without Ring Job. Write for Particulars. Joe Mullner, Box 3102, I, St. Paul, Minn.

GRILLES for most all cars. Meyers Auto Parts, 820 Dryades, New Orleans, La.

## 14 AUTO TRAILERS

BUILD your own Trailer! Save Money! Have every feature you want! Plans for House, Sport, Camp and Utility trailers. Catalog describing 9 models 10c. (15c in Canada and overseas) Jim Dandy, Box 125-B, Wausau, Wisconsin.

AUTOMOBILE—Trailer Travel, monthly magazine, $1. year. Kimbell, Plant City, Fla.



Copyrighted material

## 15 AVIATION

SEND 25c for Big War-Bargain catalogue of used airplanes located, everywhere, some probably near you. (35c first class mail.) New issue just out. Used Aircraft Directory, Athens, Ohio.

PROPELLERS—All types, for any motor, 3 blade Airliner, sleds and boats. Illustrated lightplane literature. Aircool motor conversion 50c. Standard Aerocraft, Ft. Worth, Texas.

JET Propulsion Experiments. New Principle to drive boats, bicycles, model helicopters. Circular on plans. Rush name. Houston Maupin, Tipp City 54, Ohio.

JET Propulsion. Know jet propulsion. Build your own units for model airplanes. Get complete data, drawings, design charts only 50c. Technical Press, Box 951W, Salem, Mass.

CUBS, Wacos, Taylorcrafts, Aeroncas—$125 and up! Big new catalog, 25c, lists these and thousands of other sensational airplane bargains. Some are "Easy to repair" crackups. National, Box 1682-CS, Toledo, Ohio.

HELICOPTER instructions. Rush name. Free literature. Wayne Engineering, Greenville 2, Ohio.

CUB $550, Aeronca $850. Prices often like these or less. Send 25c for listings of used aeroplanes, engines and equipment. "Sky-Pilot", P.O. Box 3197, Savannah, Georgia.

PROPELLERS for ice-snow sleds, Air boats. Literature 5c. Banks Propellers, R.F.D. 7, Ft. Worth, Texas.

## 16 BABY CHICKS

CHICKS for broilers or layers. Pure breeds, Crossbreeds. Write for prices, folder. Amstutz Hatcheries, Box 300, Orrville, Ohio.

## 18 BLUEPRINTS AND PLANS

TOY Blueprints with photographs—build Doll Cradle and Bed, Animated Circus Windmill, Electro-magnet Derrick. Full Scale. Fully detailed. 50c each. $1.00 for all. Production Engineering, 408 City Hall Bldg., Rockford, Ill.

"BLUEPRINT Reading Made Easy"—ready reference book for reading any type blueprint. 596 pages, 463 pictures. Formerly $8.95, now only $1.98. Popular Science, Dept. 56-C, 353 4th Ave., New York 10, N.Y.

## 19 BOATS, OUTBOARD MOTORS, ETC.

**FULL size, cut to shape boat patterns, blueprints. 7½—38 feet. Illustrated "Build a Boat" catalog, 10c (coin). "How to Build Boats" book, $1.00. Cleveland Boat Blueprint Co., Dept. A-77, Cleveland, Ohio.**

10' OR 15' Folding Kayak Plans $1.00. Foldcraft, 4015-R Oketo, Chicago 34.

ATTENTION Sportsmen! Have fun Kayaking! Complete kits. Easily constructed. Literature. Play-acks, Dedham, Mass.

MARINE Power—Easily convert any Ford motor (domestic and foreign) with Osco parts and kits. Complete catalogue 25c (coin). Osco Motors Corp., 2020 E. Orleans St., Dept. P, Philadelphia 34, Pa.

"BOAT-In-A-Bag" $19.75. Imagine an inflatable, collapsible, portable rubber boat folding into package 13" by 15" by 3" weighing 10 lbs. Inflated size 40" x 66". Complete with carrying case and hand paddles, only $19.75. Ask for Boat #1P. Other sizes at $24.50, $39.50, $49.50, $54.50, $59.50, $69.50, $79.50, $89.50 depending upon type and condition. New pneumatic life preserver belts 98c. Write for circular or order from this Adv. Karl Ort, Dept. PS-7, York, Penna. Dealers wanted.

FORD Marine Conversions. Catalog 10c. Lehman Manufacturing Co., Dept. A. Newark 2, N. J.

PLANS—10' Outboard Racer—Runabout, 14' family outboard Runabout—$1.00 each. Hydro-Flier Boats, 120 Douglas Ave., Yonkers 3, N. Y.

## 20 BODY-BUILDING COURSES

BAR-BELLS, Dumbbells. Exercise equipment, Courses, Special offers! Free booklet. Good Barbell Co., Reading, Pa.

BARBELLS! catalog! Bur Barbell Co., 319 Orient Way, Lyndhurst, N. J.

## 22 BOOKS, PERIODICALS, ETC.

EDUCATIONAL Books sold cheaply or rented for small fee. Books bought. Money back guarantee. 4,000 Bargains. Catalog Free. (Courses Bought). Lee Mountain, Pisgah, Alabama.

100,000 POST-WAR Jobs abroad—South America, China, India, Burma, Japan, Russia, Malaya. How and where to apply now. Post-war U. S. participation in world reconstruction and trade demands thousands of American-trained mechanics, salesmen, technicians, engineers, foremen, laborers and business representatives—every trade needed. Our 15,000-word copyrighted forecast—compiled from business, professional and government sources—lists over 200 big U. S. firms with foreign interests, gives job information, salary brackets, contract tips, application letters, passport information, climatic conditions, etc.—vital facts for your immediate application. $1.00. Return for refund in 7 days if not satisfied. Pacific Industrial Research Bureau, 202-D Studio Building, Portland 5, Oregon.

MAGAZINES (back dated)—foreign, domestic, arts, Books, booklets, subscriptions, pin-ups, etc. Catalog 10c. (refunded). Cicerone's, 863 First Ave., New York 17, New York.

FREE Booklet—The Truth About Jesus. John C. Meek—P.O. Box 512—Baltimore 3, Md.

BIG Profits Taking Subscriptions For All magazines. Agents' Confidential Catalog listing over 2500 periodicals and complete starting supplies Free. Pines Subscription Agency, Flushing, N. Y.

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Co., Chicago 5.

"$100 A Day The Easy Way" tells you secrets of the easy money game. $1.00. Rustell Co., Box 777, Concrete, Wash.

ADULT books, 25c. Five—$1.00! Free Bookalogues! Hirsch, Spring Valley 3, N. Y.

"WHOLESALE Catalog, Directory 10c". Thousands of articles. Stafford, Sunnyside-X, Indianapolis 44, Ind.

BOOKS, cards, prints, photographs. List 10c. Barringer, 1242 Lilac Place, Los Angeles 26, Calif.

REVOLUTIONARY Atomic theory; light, gravity, living matter explained: 117 page "Ether and Matter." $1.00; Clothbound $2.00. Quest, Box 73, Memphis 1, Tenn.

MAGAZINE Export Sales Co., 2984 First Ave., New York 29, N. Y. Over-issue popular American Magazines and Pocket-Size Books. Comic, Screens, Fashions Pictorials, Romances, Pulps and many others. Export Only.

NATIONAL Geographic Magazines, 1888-1946. Any issue. Periodical Service, Box 327-S, Swarthmore, Penna.

WHOLESALE Directory—Classified Guide to Direct Sources of Supply (Catalogue included) 10c. Box 12, Oaklandon, Ind.

AMAZING New GI Slang Dictionary, a must for all age Boys and Girls, super for grown-ups! Send 25c now. E. M. Publishing Co., 5 S. Straberry St., Phila. 6, Pa.

TRADE Magazines—Business, Vocational, Diversion. Current single copies. All fields to choose from. Free price-lists. Commercial Engraving Publishing Co., 34S N. Ritter, Indianapolis 1, Indiana.

REVOLUTIONARY Atomic theory; light, gravity, living mater explained: 117 page "Ether and Matter." $1.00; Clothbound $2.00. Quest, Box 73, Memphis 1, Tenn.

MENTAL Calculation, Solve problems mentally and accurately. Short method solution to problems guaranteed accurate. Send for "The Trick of Mental Calculation." $1.00 Postpaid. Kal-Q-Lations, P.O. Box 1232, Milwaukee 1, Wis.

**BOOKS, (out-of-print, new, used) quickly supplied, many 35c bargains. Catalogue.** Mid-West Book Service, **18870 Marx Ave.,** Detroit 3, Michigan.

BOOKFINDERS! (Scarce, out-of-print, unusual books) Quickly supplied. Send wants. Clifton, Box 1377ps, Beverly Hills, Calif.

AMAZING Books Sample 25c. Eugene McLean, 3300 N., Eureka, Calif.

BACK number magazines reasonable. Reedmor, 841 Intervale Ave., New York, N. Y.

ADULT Books. Catalog and Sample, 10c. Oudeman, Box 1840, Cleveland 6, Ohio.

A PROFITABLE business of your own with glow in the dark products. Sample 10c (refunded). Progressive, 210 Bleecker, Brooklyn, N. Y.

HERE'S Really Big Value! To introduce new, timely literature to all, we will send the following Postpaid, for only $1.00. A complete soil testing kit; a 36 piece Name Tape Kit; a G.I. Talk Slang Dictionary; and a 240 page midget Bible, together with introductory book literature. E. M. Publishing Co., 5 S. Strawberry, Phila., 6, Pa.

LONELY Hour Books—send for confidential Reading List. Poets Corner Press, 309 Third, Palisades Park, N. J.

BOOKS, Pictures. List Free. Assortment $1. Adults Books, 9—$2. Nu-Art, 436 N. Y. Ave., Brooklyn 25, N. Y.

HERBALISM—Complete Course in 2 volumes. 1000 recipes. Particulars free. Home Service, Forestville 3, Va.

JOIN new Technical Book Club—free! Members receive current literature, guidance on all book problems, premiums. No obligation. All technical, homecraft, farming, sports, etc. Specify subject for free information. Modern Technical Book Co., Dept. M2S, 55 W. 42nd St., New York 18.

"RUTHBELLA" Journal by Antero Sansicchi; First Edition $5.00. Free confidential Reading List. Lonely Hour Books, 309 Third, Palisades Park, N. J.

"RADIO For The Millions"—practical book. Complete instructions for building 78 radios, phonographs, other sets. 192 pages, 648 pictures. DeLuxe edition, $1.98. Popular Science, Dept 56-C, 353 4th Avenue, New York 10, N. Y.

"FIX It Yourself"—home repair book. How to fix appliances, furniture, plumbing, etc. 256 pages, 163 pictures. $1.49. Popular Science, Dept. 56-C, 353 4th Avenue, New York 10, N. Y.

AMAZE with supermemory! Facts, figures, names stick like burrs. Write B14, Thor Books, Box 1210, Chicago.

BIG Book Bargains! Best Sellers: Fiction, Non-Fiction, Scientific, Technical, Textbooks, Manuals. Cooperative club offers wonderful savings. Catalog available. Holcomb, 2006 Bernard Place, Dallas 11, Texas.

POWER through Knowledge. Extraordinary Bargain Catalogues. Stamp. Continental Publications, Elmhurst, New York.

SURRENDER document Amazing unpublished photo's taken by myself. Actual photos of Okinawa surrender document signed by General Stilwell also, Ernie Pyle's shrine, Okinawa women, Jap burial vaults and others only $1.00. O. Bell, 273 Hirliman Rd., Englewood, New Jersey.

FREE Catalog Semi-technical books for home study, reference, schools. Livingston, 4034 Keystone, Chicago 41.

BOOKS . . . new, used, rate. 6c brings "Bookfinder" 319 So. Marengo, Pasadena, Calif.

BUY Wholesale Thousand Articles. Catalog, Directory, Other Valuable Information. 10c. Latshaw, Sunnyside -C, Indianapolis, Ind.

WHAT Every Mason wants. We have Masonic books for Blue Lodge, Chapter, Commandery Scottish Rite and Shrine. Our rituals are used the world over. Send for our free catalog of books and rituals for Masons, Odd Fellows, Knights of Columbus, etc. Eza A. Cook, Publisher, Inc., P.O. Box 796-RMY, Chicago 90, Ill.

ATTENTION. My Personal Record Beautiful bound book to keep record of your Education, Employment, Military and many others. Helps you to obtain better position. $2.00 Money-order. 232 N. Marlyn Ave., Balto. 21, Md.

EXPANSION Watch Bands stainless steel $1.50. Dozen $15.00. Deluxe Goldplated $2.25. Latshaw, Sunnyside—C, Indianapolis 44, Indiana.



Copyrighted material

OPERATE Magazine Subscription Agency Wholesale Catalog 5000 Magazines, Complete Supplies 25c. Cassell Publishers Service, Westfield, New Jersey.

FLOYD CLYMER'S Popular Motor Books. See classified advertisements under Automobiles, Motorcycles.

15 SCENES Of life in the South Seas. Actual 3½x5 close-up photos of Native Girls attired in grass skirts. Taken in the Wilds of South Pacific by a "Seabee". $1.00 postpaid. Albert Bachand, Box 313 Dept. 3, North Adams, Mass.

ATOMIC AGE SHORTHAND
In five lessons, ten cents each, something different. Circulars. Elliott School, Estb. 1924, 4426 Carrollton, New Orleans, La.

LEARN intimate truths. Adult book, illustrated. 25c Kogan, 1032-S, New York 8, N. Y.

## 23 BUILD IT YOURSELF

WHEELS for your own construction of wagon scooter, racer and bicycle trailer. Drawing 25c each 8 x 2", 10 x 1.75". Metal wheels with puncture-proof tires, ball bearings, $2.25 per 8" wheel. $3.25 per 10" wheel. F.O.B. Akron. Send orders to Jim Brown's Toy Co., 868 E. Tallmadge, Akron, Ohio.

BUILD Concrete Block Machine. Vibration and hand operated types. Easy, inexpensive. Sell blocks, build home, garage, barn at low cost. Free details. Horne, 206 W. Wilder, Tampa, Fla.

KEEP Food Cool without Ice, Electricity. Build Fogwood Cooler, Chimney draft operates. Plans 25c. Fogwood Company, King, Ontario, Canada.

BUILD Tractors from Second hand automobiles. Convert horse drawn farm equipment into tractor hook-up. Tractor plans—$1.50. Mowing Machine and plow hook-up plans $1.00. Nolan's Garage, East Wareham, Mass.

SPEEDY Midget 1" Motor, runs on top of flashlight cell! All parts, instructions 25c. Fonskov, 18 Lutheran, Newburgh, N. Y.

CONCRETE Mixer efficient inexpensive from oil drum hand operated plans $2.00. Anthony Mitkos, 8802 Corwin, St. Louis 21, Mo.

CONCRETE Blocks, build home, garage Etc. Average 8 cents each. $10.00 will start you. Rush $1.00 for Plans. James E. Keegan, 1735 Newark St. S., St. Petersburg, Fla.

PLYWOOD Cabinet Kitchen Plans 25c. Playne Cabinets, 4617 Johnson Ave., Western Springs, Ill.

BUILD concrete block machine, Easy and inexpensive. Blocks will make wall with 100 percent dead air space. Plans $3.00. Max Cox, Box 230, Springdale, Ark.

INEXPERIENCED? Build Your Home Yourself! My Third Year Showing Beginners. Sound Construction. Your Labor Saves Up To 60%. Valuable Circular 25c. William Jackson, A.B., 1713 Howard, Port Huron, Michigan.

SEND 25c. G.I. Self Building House Members book. Bello, Gardner, Mass.

BUILD automatic acetylene welding generator. 25 pound carbide capacity. Plans $1.50. H & B Plan Service, 8981 N. Fortune Ave., Portland 3, Oregon.

COPYRIGHTED Blueprints and Instructions makes your lawnmower a gasoline powered machine. Send $1.00 to, Easy-way Systems, 284-A State Park Drive, Bay City, Mich.

WIZZ Electric Motor: Flashlight cell operates. All parts plus illustrated instructions 25c. Also smaller "Mighty Midget" 1" model 15c. Include 5c postage. Eltro Co., Deer Park, N. Y.

FURNACE melts all metals. Ideal for small business or Home workshop. Built cheaply from scrap material. Free details. Aladdin Labs., 9955-c St., Oakland 3, Calif.

FOSSIL Shells from Wyoming, write Larry's Novelty Shop, Box 1771, Billings, Montana.

FREE List of "Build-ur-Own" Pamphlets. Pamphlet Publishers, Des Moines 12, Iowa.

BUILD a fine home quick freezer. Shop tested plans, detailed instructions, $2. Davis Engineering Co., 911 E. Elmwood, Burbank, Calif.

INEXPENSIVE Jigsaw; circle saw; plans 25c each. Jeffery, 2214 Wolcott, Flint, Michigan.

BUILD beautiful swings that rich people buy, blends with any landscape. Sure-Seller, Big profits. Templates, plans $3. Big John, Lafayette, La.

MAKE parts yourself, for your hobby, with machine or hand tools in our shop, or have us make them. Send specifications for estimate, or visit us 6 PM to 10 weekdays, 9 AM to 5 Saturdays. Craftsman Shop Service, 23e Calyer St., corner of Oakland St., Greenpoint, Brooklyn 22, N. Y.

AIRPLANE Model Builders, Expert & Novice, Universal Jig. Absolute Accuracy, Quick Assembly all scale & flying models. Build In One Hour. 25 Universal Clamps & Complete instruction $1.00. Universal Jig Mfg. Co., Box 787-3, Rochester, N. Y.

SEE page 272 advertisement headed "From Hawaii—You'll Love It!!

WELDER for farm or home. Uses house current. Inexpensive. No windings, motors, transformers or liquids required. Build in an evening. Plans $1.00. Frank's Projects, D22, Box 555, Louisville, Ky.

## 24 BUSINESS OPPORTUNITIES

COLORGLAZED Concrete Pottery made without molds. New, low cost, patented method. Cemetery products, novelties, tiles, floors, etc. Basement leaksealing. Other money-making projects. Booklet, details free. Men only. National Potteries, Fergus Falls, Minnesota.

GOOD Paying Business Silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late method. No tanks or shop required, outfit furnished. Free Booklet. Gunmetal Co., Ave. E, Decatur, Illinois.

START Home business making statuary, plaques, art goods, pottery, garden furniture, artificial marble flooring, liquid marble. Make flexible molds yourself. Amazing profits. Folder free. Creative Publishers, PS5, Winnetka, Ill.

$25 WEEKLY working two hours daily. No canvassing. No Manufacturing. Lycke, Box 2471, Cleveland 12, Ohio.

MOLD-MAKING, Plaster casting. Money-making Business. Literature Free. Kemilo, Park Ridge, Illinois.

MAIL Order Business course shows you how to make money, spare or fulltime. Teaches professional mail order technique—not penny-snatching schemes. Fascinating 100-page illustrated Success-Catalog Free! Write—Nelson Co., Dept. 4-01, Chicago 5.

BOOKKEEPERS — Operate Your Own "Dollar-A-Week" Bookkeeping & Tax Service. Full or spare time. Details free. Ellis, Box 203, Cedar Grove, N. C.

137 PLANS to make money; local, mail order. Particulars free. Elite Co., 220-A Grand St., N. Y.

YOUR own business. Big profits, very small capital. National organization teaches, helps, supplies everything. Interesting service business. Big demand. Everywhere. Americlene, 211 N. 7th St., St. Louis 1, Mo.

ONLY $7.30 yearly, operates office under your own name. Co-operative Offices, 126 Lexington Ave., New York.

LIQUID Marble; snow-white, multi-colored. Glazed. Unglazed. Composition Flooring. Lifetime wear. Any color. No priorities. Flexible molds. Plaster casting. Get into the big money now. Full information given free. Write—Compo-Tex, Box 786-F, St. Louis, Mo.

LEARN Shell jewelry manufacturing. Complete, simplified home instruction course, beautifully illustrated, shows 45 styles pins, earrings, brooches, sprays, hair ornaments. Includes pearlizing, dyeing, golding, glow-in-dark methods. No tools needed! Learn-earn within a week. Only $1 postpaid, including wholesale prices of all raw materials. House of Gifts, Box 4550-AS, Coral Gables, Fla.

AT Home—Your own manufacturing business; making popular $1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. E-601, Cincinnati, Ohio.

OPERATE profitable Mail Order Business. 75c profit each dollar. Powell Service, 5713 Euclid, Cleveland 3, Ohio.

START Mailorder Bookshop—Everything furnished; publisher cooperation. 25c brings booklet, exclusive setup, samples, exciting ideas. General Publications, Ossining 1, New York.

WANTED Unused U. S. Postage Stamps, small discount. Advance Stamp Co., 24 E. 23rd St., New York.

MAKE Big Money. Exceptional Opportunities. Real Money Makers. Free Particulars. Turner, 5675-B Lannoo, Detroit, Mich.

$5,000 YEARLY Possible, selling books by mail. Distributors proposition. Nichols Publishers, Box 831, Pine Bluff 3, Ark.

BUSINESS Plans Illustrated. Proven money-makers for operators from Coast to Coast. Write for proof. Wilkin & Co., 111½-P. E. Main, Hillsboro, Ohio.

MECHANICALLY Inclined Men—Own and operate general Appliance Repair shop. Complete, illustrated course shows you how. Welding, Refrigeration, Motor repair. How to get business, etc., all phases covered. Free literature. Christy Supply, Dept. 762, 2835 N. Central Ave., Chicago.

IMPRINTS for Mailorder, Dime (refundable) Volchok, 1098 S. Gerard, New York 52.

IF you would like to make $5,000 yearly in an easily learned office business of your own, send for free details immediately. G. H. Cole, Pres., Syracuse 2, N. Y.

RECAST old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

WORK For Yourself. Average $1.00 hourly. Absolutely no selling. Pleasant spare-time work. Convincing particulars, stamp. American Business Service, Nescopeck, Pa.

OWN A Mail-Order paper products business. Sell envelopes, tags, bags, boxes by mail, wholesale. Tremendous demand. Steady profits. No capital necessary. Write Omaha Envelope Service, Dept. 139, 4721 California, Omaha 3, Nebr.

PROFITABLE Business—with distinguished books of History, religious, Health, Biographies, Dictionaries. Hurry your success. Material and plans $1.00. Information and other offers 10c. Parcell Market, 2701 S. Main, Elkhart, Indiana.

FINEST quality Liquid Molding Rubber. Sample Mold Free. Cost more—worth more. $3.00 quart. $10.00 gallon. W. Wooley, 115-B Donald, Peoria, Ill.

POSTWAR Security! The greatest legitimate scheme ever devised to secure a big mailing list and a stream of dimes. Free particulars. Jack Killion, Box 3096 Terminal Annex. Los Angeles 54, Calif.

SIX Mail Order Trade Publications 25c. Containing Articles, Plans, Schemes, Wholesale Offers. Kraft, 3114-S2 Walnut, Chicago 12, Ill.

CASH In. 64 page book, over 40,000 words, 25c, Money making business secrets, Mail order plans galore. No ads-meat only. N. W. Cohen, Dept. 23, 1141 S. Independence Blvd., Chicago 24, Ill.

SPLENDID New Opportunity to get into legitimate Mail Order Advertising and Selling. Start small, expand rapidly. "How" booklet 10c. Kraft, 3114-S6 Walnut, Chicago 12, Ill.

BELIEVE in Jesus Christ and keep the commandments and you will be saved. Delay is dangerous. Richard E. Shafer, 3515 Thorndale Rr., Pasadena 8, Calif.

WHY Job Worry? Learn Electro-Plating, Interesting, Highly Paid Business. Postcard Brings full details Free. Plater Hyde, Dept. SC, P.O. Box 176, National City, Calif.

EARNINGS, $2,000 year easy; inventing simple items for special cash markets. Ideas only. No patents. Write Hendrickson, Argyle (8), Wis.

GOT $24,500: Used three schemes from "Schemer" Magazine, Alliance, Ohio. 48th year. Three samples, 25c.

BIG money in Plastics at Home. Free details. Anderson, 311M George St., Toronto, Ontario.

AMAZE others. Add columns instantly. Add faster than adding machine. Free details. Maths Institute, Box 633, Mobile 4, Ala.

QUICK Money! "Repairing Car Batteries." At home. Easy too. Write, Batteryman, 901 South Avenue, Grand Junction 1, Colorado.

FELLOW Workers—Down with Bosses—Start own business—Be Independent—Booklet describing 137 Tested Plans, free. P. Padney, 307 York St., Jersey City, N. J.



Copyrighted material

"10,000 ALASKA Fishing Jobs." Alaska's largest industry regularly employs thousands of men and women in seafoods production. Possible earnings up to $5,000 in few weeks. Authentic 7,000-word copyrighted report gives job information, union requirements, sample application letter, names and addresses over 40 Alaska fisheries. Newest edition includes similar information on California, Oregon and Washington fisheries. Vital facts for immediate application in a permanent industry. $1.00. 7-day refund privilege. Pacific Industrial Research Bureau, Dept. PS-9, 202 Studio Bldg., Portland 5, Oregon.

"HOW To Make Simple Molds and Plaster Plaques." Profitable Business or Hobby! Instructive booklet 25c. Plastercraft, 1406 East 43rd St., Cleveland 3, Ohio.

START coin machine route. Buy new machines. Immediate delivery. Prices $27.50 to $235.00. Write for circular. Webb Distributing Co., Dept. P40, 6 S. Kedzie Ave., Chicago 12, Ill.

SYNTHETIC Latex with Neeprene base for making flexible molds! Quick drying! Quart $2.00, Gallon $5.95. Full instructions. Plasticraft, 1406 E. 43rd St., Cleveland 3, Ohio.

MAIL Order Business can be your future. Same as hundreds advertising in this and other publications. "How To Build Your Own Mail Order Business"—noted Specialist's 10,000-word Treatise—shows how to make it pay, on small-capital-start. 25c postpaid. Satisfaction guaranteed. Maupin & Maupin, LaFayette 3H, Indiana.

PLASTICS—Wholesale and retail sources for thousands of items, materials, molds, equipment, machines, supplies. Directory $1. Plastics Digest, 3937R Tracey, Kansas City 4, Mo.

SELL by Mail Books, Plans, Complete plan, sample Imprints Dime. Dixie Mailers, King, N. C.

MAKE and mold genuine plastics merchandise (Lucite, etc.) Forty worksheets with 70 illustrations explain simple methods, processes. $1. Free circular. Plastics Digest, 3937D Tracey, Kansas City 4, Mo.

START Mailing Service Business. Quarter (refundable) brings Success Booklet and big mail of money making opportunities. Al Riegel, 1111 Harrison, Phila 24, Pa.

Operate profitable home mailorder business on $5 capital. Bittner, 941 Montpelier St., Baltimore 18, Md.

STOP! Don't throw it away. There could be a fortune in your attic or cellar. Fascinating, new. Particulars only 25c. Research Enterprises, P.O. Box 5296, Highlandtown, Baltimore, Md.

SUREFIRE Profit Maker. Write for details, on what sells who buys and how to reach them. Rennolet, 1022-P 9th St., Rock Island, Ill.

START a mailorder business in spare time. Details free. Monarch, 38-B Jefferson, Auburn, New York.

SPECIALTY Manufacturing, the big money business that can be operated anywhere, start on a very small capital; we supply dependable formulas and complete instructions; get interesting Free booklet, "Moneymaking Opportunities in Specialty Manufacturing." Howard Robinson, Ph. G., 1300-B S. Ohio St., Sedalia, Mo.

"WHOLESALE Directory" Direct Wholesale Sources—3c stamp. Woessner, 2869-C N. Talbot, Indianapolis 5, Ind.

NEW Air curing liquid rubber to make molds for plaques and statues. Makes casting a pleasure. Apex Plastic Products, 1740 Estes Ave., Chicago.

TYPIST profitable business at home complete information. 50c. Gaunt, 3521 Broadway, Chicago, Ill.

HEALTH First! New Drugless Method. Dynamic techniques; quickly learned. Results Unbelievable. Big earnings operating a "Health Conditioning Club". Metabasic, B9128-C, Sta. S., Los Angeles.

COLOR Concrete with Chemicals. Big money making Hollywood style pottery, birdbaths, without moulds. Wishing-wells, stucco-rock, benches. Marbling, cement water-paint. 10c brings sample, literature. Pictures. Hollywood Cementcraft, 8530 Wonderland, Hollywood 46, California.

YOUR Big mail order opportunity—No time has ever been as good as right now. Get your start right. Let me show you how, what to sell and who will buy. Big profits, easy work at home. Write, H. S. Smith, 3139A S. Mabbett Ave., Milwaukee 7, Wis.

TYPEWRITER Repairing—Original Course —Simplified Home Study. Weber Typewriter Mechanics School, Box 269, Osborn, Ohio.

LIQUID Marble—make in any color. Soundproof Plastic Flooring. Flexible molds. Cast novelties, plaques, statuary. Big Money, your own business. Free Information. Write, Bing Products, 88-BM Broad St., Boston 10, Mass.

LIQUID Rubber, for making flexible molds, literature & sample free. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

FORGE Ahead in the Mail-Order Field with your own business; regardless of location, Small capital, plus initiative, starts you toward success. Particulars free: Write:—Tait-Douglas, Dept. 312-A, 5345 Harper, Chicago 15, Ill.

DO-it-yourself! Thousands strangely richer! Permanent security now! Start without money! Unlimited, easy, mailorder work. A Better Living wants you! Airmail dollar. Results or refund. Zigzag Corp., Box 101-X, Guatemala, Central-America.

10c BRINGS You lots of mail! Money making ideas, publications, home work plans. Yearly listing. Gardenville Publishers, Gardenville 2, New York.

BABY Shoes Preserved. Complete Instructions. Exclusive Rights. M. E. Watson, Bellefontaine, Ohio.

MAIL Order Opportunities. Read oldest Trade Journal. Copy 25c. Mail Order News, Somerville 47, N. J.

START, Health business by mail small investment, Burke, 1345, Robson, Vancouver, Canada.

HARDWARE Business is one of the most interesting and profitable of them all. Be independent. You can start your own retail store with small investment and no previous experience. 15,000-word copyrighted booklet tells you how. $1.00 postpaid. C. R. Divan, P. O. Box 325, Santa Monica, Calif.

TRADE Magazines use your name, pay well for descriptions of systems, shortcuts. Learn details $1.00. Guide Publications, Box 292, Hartsdale, New York.

ACHIEVE Wealth! Precious Process—$2.00! $1,000 Authenticity Guarantee! Katchar, 186 Rutledge St., B'klyn 11, N. Y.

WOULD You pay 3%—first $350 made? Color-illustrated book "505 Odd, Successful Enterprises" free! Some plans offer occasional "day off." Start at home, office. Expect something odd! Pacific, 262-G Drake, New Rochelle, N. Y.

HANDY Men—Earn money home operating Community "Fix-It" Shop. Write, Stafford, 708 Rawlings, Carbondale, Ill.

START a clock shop while clock repairing is booming. Our easy to learn home study course with pictures and illustrations teaches you how to repair all kinds of clocks. Information free. Houston Clock Shop, P.O. Box 5086B, Houston 12, Texas.

HOW and Where to obtain capital. Particulars free. Star Service, Wapakoneta, Ohio.

HOW to make money by mail, easy way to start new or expand your present work; opportunity success operating plan, no capital needed, no loans, sure-fire profits; astonishing full particulars free. Capitol Industries, 335 Rock Creek Church Road, N.W., Washington 11, D. C.

GET Into New Highly Profitable Profession "Church Money-Raising Campaigns" Exclusive franchise. Send 25c, good faith, for copyrighted instructions, supplies worth $1.00, refundable. Director Snyder, 110 Crestmont, Reading, Pa.

OPERATE your own profitable business anywhere. Free details. Yates, Box 2152, Columbus 16, Ohio.

WHOA Now! Business Opportunities. Start a spare time Mail Order Business. Send for "Dollar Tips", plus "Progressive Mail Trade", 52 page magazine. Your copies are ready. Send today. Only 25c (coin) Postpaid. The Rampud Co., Box 1857, Denver 1, Colorado.

TYPEWRITER Repairmen urgently needed. Earn $40 to $50 weekly spare time. Our easy to learn home study course teaches how to repair typewriters. Write for free information. Houston Typewriter Repair Service, P.O. Box 5357B, Houston 12, Texas.

NEW Mail Order dealers, want a guaranteed Sales Letter for $1.00. If you don't believe it, write Capitol Industries, 335 Rock Creek Church Road, N.W., Washington 11, D. C.

START Furniture Refinishing Shop: Address P. Kepko, 500 Thornton Ave., Sharon, Pa.

THINK of it! A Million Dollars in three years! Without risking one dime. Most astounding plan ever conceived. Veritable "Gold Mine" opportunity to make Big Money at home, selling this plan by mail. Practically no capital required. Experience unnecessary. Complete details, 25c. Money-back Guarantee. Profit Builders, 305 W. 8th, Dept. B, Los Angeles 14, Calif.

CAST bookends and novelties. We furnish rubber molds and buy your unfinished castings. Free information. Mold Craft Industries, Manheim, Pa.

$4.97 PUTS You in business. Write, Midwest Drug Co., Dept. 5, Columbus 15, Ohio.

FIREWORKS manufacturers who ship direct to you. List, 25c. Sales, Box 599, Grand Rapids 1, Michigan.

BECOME a Finance Man. Particulars free. George Lenhoff, Lincoln 8, Nebraska.

GUARANTEED Income! Grind Lawn mowers. Instructions $1.50. Mowers, Janesville, Wis.

RUBBER Moulds for casting novelties. Latex for making Moulds. Use thoroughly tested and approved products. Eastern Latex Laboratories, Box 153, Mattapan 26, Mass.

MAKE "WonderLink" Jewelry. Profitable sideline! Free details. Trial 200 links and instructions, $1 (refundable). Plastic Works, 712 Kimball, Danville 2, Ill.

LATEX for making flexible rubber moulds. Thoroughly tested. No shrinkage. Complete instructions with each order. Stoneham Rubber Co., Box 244, Stoneham 80, Mass.

WE start you in business at home. Spare-time earning $10-$30 weekly, selling by mail. Stamp appreciated but not necessary. Driscoll Sales Service, Box 2771-G, Denver, Colo.

WHY Money Worry? Own—Operate typewriter repair business. Low capital required. Large earnings! Qualify quickly. Easy directions from Athey's Typewriter Supply, PS-5, Tarentum, Pa.

MAILING lists—all types, accurate, inexpensive, write Charles, Box 232, Station A, Manchester, Conn.

YOUR Own Business, making fast-selling Plastex Novelties in your home. Spare, full time. Small capital. Big Profits! Folder Free! DeWeese, Box 1023, York, Pa.

WE Help Start you in business. Men—women earn good steady incomes. Full or part time. Information Free. Crosby Service, 1412-13 Great Northern Bldg., Chicago 4, Ill.

BE Your Own Boss, lets tell you how. Postal brings facts. Hip's Mail Service, 6550 Oleatha, St. Louis 9, Mo.

JIGSAW Owners: Square foot plywood yields $46. Write; Woodart Co., X-44, Bridgewater, Mass.

NOTICE 75c can make $3.25 for you. No selling. Particulars 50c. Refundable. Charles Chapman, 4636 Ave. U, Birmingham, Ala.

METALLIZE Baby Shoes! Learn this moneymaking business from nationally recognized consultant. See Kushner Ad Page 253.

OPERATE Your Own Advertising Agency Profitably. New. Different Manual Reveals All. Learn How. Start In Spare Time, At Home, With Little Capital. No Stock Or Equipment Necessary. Earnings unlimited. Sincerely Interested Send Stamp For Special Folder. S. Snyder, Box 4907-A, Philadelphia 19, Penna.

WHAT Makes You Think You Couldn't Sell By Mail? We're Doing It, Happily! New! Different! Exclusive! Alive with Money-Making Opportunity. Full Particulars Free. Investigate! Compare! The What-To-Do Shop, Box 1082, Tacoma, Wash.

SELL By Mail. Particulars Free. Write Frank J. Artz, 1060S Harding Drive, Toledo 9, Ohio.



Copyrighted material

GAIN Independence, financial security! Start own profitable business at home; full, spare time; local, mail-order. Free literature explains how you can start quickly, easily. Write postcard today, now! Heckl's Sales & Service, Monogah 1, W. Va.

FREE booklet describes "Collection 137 Tested Plans"—Full or spare time. Fully illustrated. Kakay & Co., Box 1032, Tampa 1, Fla.

SPARE Time Mail Business Earned $1400 Monthly. Copyrighted Instructions, $1.00. Will Boyd, 331 Fourth, Pittsburgh 22, Pa.

GO into rug and upholstery cleaning and mothproofing business. Extra double profits selling these two professionally used products to stores and homes. Russell-Johnson Co., Clarkfield, Minn.

BUILD Own Business Mailing penny post cards; six profitable plans with information for starting. Gordon Publishers, Box 23, Pawtucket, R. I.

INCORPORATE in Delaware. Many advantages. Free details. Corporation Fiscal Company, Inc., Delaware Trust Building, Wilmington, Delaware.

OPERATE profitable Home Business. Details Free. Lisbon Service, R-4, Lisbon, Ohio.

EXPORT, Import, represent manufacturers. Deal with South America, Africa, China, Europe. War-peace time big business. Uncrowded fields. Unlimited opportunities. Deposit one dollar for two bulletins. Money refunded if unsatisfied. S. Benko, 246 Fifth Avenue, New York.

BUILD Miracle Homes. Yours. Others. Chamberlain, Fitzsimons Building, Pittsburgh 22, Pa.

BELTS! Make 'm and make money. No tools! Sample 50c. Art Leather, 411 Joseph Ave., Rochester 5, N. Y.

GET big mails galore, latest money making offers, opportunities, catalogues, magazines, Samples etc., etc., by having your name listed in the National Opportunity Seekers Directory. One issue 10c three 25c. Interstate Publishers, 1429-G So. 51st, Cicero 50, Ill.

WHOLESALE Distributors: Amazing patented screw-holding screw drivers; removes, holds, inserts screws instantly hard-to-get-at places; also used as regular screw driver; 7 models; tremendous market to stores, factories; big profits; returnable trial order. Write now. Millen Mfg., 93B Federal, Boston, Mass.

THE Haven plan puts You on payroll $1 Refundable. 708 E. Haley, Santa Barbara, Calif.

OPERATE profitable Mail order business on $5 capital. Information Free. Robert Taylor, 65 W. Gt. Miami Blvd., Dayton, Ohio.

"SUCCESSFUL Mail Merchandising" tells everything necessary to make "hundreds" by mail sensational details Free. Kommer, 2354 31 Ave., San Francisco 16, Calif.

RADIO—Practical training at minimum expense. Write—Hayes, 4004-A Arcade Bldg., Seattle, Wash.

SELL by mail. Books, courses, popular specialties! Big profits! Write Albert Wilcox, PS23, Nicholls, Georgia.

MEN—Women start own business, home or office; no peddling; little or no investment. Particulars free. Paisley, Box 5307, Los Angeles 55, Calif.

FAMOUS $12.50 Reynolds Fountain Pens $8.50—Beautiful Stainless Steel Watch Bands—$2.00, Gold Plated, $3.00. Quantity Prices, Electronix Sales, Pawtucket, R. I.

FREE details! Start profitable mail order business at home on $5 capital. D. Axtell, 3705 Zender, Detroit, Mich.

LIQUID Marble—Colorful, glazed! Molded, brushed, sprayed! Composition floors, Rubberlastic Molds, Plastic Homes. Particulars free. Marbelizing Service, Edwardsville, Illinois.

PLASTIC Homes—Wonderful building material. Resurface old homes—build new ones! Colorful! Beautiful! Particulars free. Marbleizing Service, Edwardsville, Illinois.

MANUFACTURE Costume Jewelry At Home For Profit, Hobby, Therapy. Free Wholesale Supply Catalogue, Instructions. Florida Supply House, Bradenton, Fla.

PIPE buildings for termite and ant control; particulars, Coastal Termite Method, Raymondville, Texas.

BOOKKEEPERS: General ledger and tax report experience. Operate permanent, profitable accounting service for the smaller business. Part or full time. Simplified method. Write now! L. A. Bell, 1402 West 25th Street, Cleveland 13, Ohio.

WELDING is growing day by day. Good business to enter Now. Get this 400 page nationally known book on welding. Simple instructions, many illustrations and photographs. Complete "Know how" information given by recognized experts. Send $1.00 for this wonderful book and complete details how to earn home and shop welding outfit. You learn and earn. Magic Welder Mfg. Co., 193 MS Center St., New York City.

FREE booklet describes 137 tested money making plans Home Or Office. Sem Tem Service, 24 Wall St., Norwalk, Conn.

YOUR Own Business—As little as $100 starts you Now! No training needed! See our ad on page 42. American Photocopy Equipment Co., 2849 N. Clark St., Dept. HU56, Chicago, Ill.

## 25 BUSINESS SERVICE

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Co., Chicago 5.

CANADA'S Goldfields Booming! $1.00 Brings Priceless Information. Write Box 74, Ft. Wm., Canada.

MAIL forwarded 25c. Postcards mailed 15c. Personal and business representation. St. Louis souvenirs 25c, 50c. Beautiful Photobook, $1.00. Multicolor Folder 35c. Mail Service, Box 1784, St. Louis, Mo.

TO Whom It May Concern: We will represent you in the principal cities in the United States; Alaska; Brazil; Canada; Cuba; Greece; Hawaii; Mexico; Newfoundland; Panama; Philippines; Puerto Rico; South Africa and Sweden. Personal or business assignments $1 per hour. James W. Farley, Citizens Bldg., Cleveland 14, Ohio. Note: Would appreciate hearing from someone who wishes to enter this business in your city. Will send you assignments immediately. References exchanged. State qualifications.

NEW YORK CITY at your doorstep! Capable, experienced, confidential representation. Commercial or personal transactions. Write your requirements to: Multiservices, 39A E. 7th St., New York City 3, N.Y.

## 26 CAMERAS, PHOTO SUPPLIES

BASS Says: War time proves Bass leadership. Amazing selection of finest still cameras—Leica, Contax, Korelle, Reflex, Argus, new and used still available. Write for quotations. Satisfaction guaranteed or your money refunded. Bass buys 'em, sells 'em, trades 'em. 35c Postpaid for 100 page book "Military & News Photography" by Jack Price. Up to the minute information. Bass Camera Co., Dept. SP, 179 W. Madison St., Chicago, Ill.

HAVE You a camera. Improve your hobby of photography and learn how to make better pictures. Write today for our latest book catalog and sample copy of American Photography, containing articles and pictures by the world's foremost writers and photographers. Camera House, 603, 353 Newbury St., Boston 15, Mass.

CASH! Spot cash for cameras, lenses, binoculars, movie or still, sound projectors. Send full description by mail, or wire for prompt cash offer. Over 30 years of dependability insures honorable dealings. 35c Postpaid for 100 page book "Military & News Photography" by Jack Price. Up to the minute information. Bass Camera Co., 179 W. Madison St., Chicago, Ill.

PHOTOGRAPHY for pleasure or profit. Learn at home. Practical basic training. Long established school. Write for booklet. American School of Photography, 1315 Michigan, Dept. 1742, Chicago 5.

USED Camera Directory, Box 1031-K, Canton, Ohio—lists hundreds of War-Bargain Used Cameras—35mm, Speed Graphics, Kodaks, Rolleiflex—many others. Send 25c for latest issue.

"PHOTOGRAPHY For Fun", 50c. Free catalog. Stone, Lunenburg 55, Mass.

INTERESTED in Photography as career? Send stamp. Frank Smith, Midland Park, N. J.

FOR Immediate Delivery Cameras and Equipment: Movie Cameras, Projectors, Still Cameras, Enlargers, Lenses, Screens, Printers, Trays, Film, Paper, Chemicals, Reflectors, Dryers. Complete stock of Darkroom Equipment and Hundreds of Other Photographic Items. We pay highest prices for used cameras and equipment. Send for Free New Big Catalog. Flash Photo Sales, 30 W. Washington St., Dept. M, Chicago 2, Ill.

AMAZING Developer: Air, Light won't spoil it. Time, Labor, Money Saver. Patented LT-18 doesn't spoil when not in use. Quart 75c, gallon $1.10. Graphic Sales Co., Dept. 10, 123 W. Madison, Chicago 2.

EXPOSURE meters at bargain prices. Our price De Jur Model 5B with case only $13.39 plus $1.06 tax. Brand new and guaranteed. Immediate delivery. Townsend Products, 755 Boylston St., Boston 16, Mass.

YOU need "Sales of Tales" and our free list of "Build-ur-Own" photo gadgets. Pamphlet Publishers, Des Moines 12, Iowa.

FILMS? Fresh? Dated 1948, Outdoor type. 127—$3.49 Dozen. 120 or 620 $4.21 Dozen. 116 or 616 $4.81 Dozen. Postpaid. "Cameraman" 542X 5th Ave., New York 19.

PICTURES from everywhere. Build priceless collection of worthwhile prints. Exchange with camera enthusiasts everywhere. Beginners or advanced workers. All sizes—subjects. Bi-monthly bulletin. Years registration $1.00. Information free. Photographic Exchange Club, 1206-A New York Ave. N. W., Washington 5, D. C.

CAMERA, New Candid Model. Good Lens. Uses 127 Film. Exceptional Value—$3.25. Films, Standard Brand, Fresh Stock, 120, 620 each 30c. 116, 616 each 35c. (127, with camera order, tested surplus film 27c.) Limit Dozen. Add 10c postage on order. Photo-Craft, Box 470-T, Jamaica 1, New York.

## 27 CAMPING

A PROFITABLE Camp for alert-minded boys 14 to 16, with ambition to make the best of themselves. Practical tests in mechanics, arts, sciences, business, professions, construction, agriculture, transportation. Live The Life of Reilly while securing inventory of your capabilities. Sanitary camp, healthful location, salt-water bathing, boating, horse-back riding. Send for circular about Finding Your Job. Rev. Alfred V. Bliss, 245 Winthrop St., Taunton, Mass.

## 27A CANDY MAKING

MEN—Women—"Everybody Likes Candy". Learn to manufacture professionally at home. (Our 35th Year). Ragsdale Candies, East Orange, N. J.

## 30 CARTOONING, SIGN PAINTING, DRAWING AIDS

CARTOON Courses—22 Easy Lessons. 200 figure sketches. 25c coin postpaid. Snack-Pack Co., 32 E. Georgia, Indianapolis 4.

MAKE Signs, letters, stencils. 9 complete alphabet pattern sets. 3 complete numeral pattern sets and catalog $1.00. Sign Letter Distributors, P.O. Box 101, Mineola, N. Y.

CARTOONING, Draw comic characters instantly. Complete charts, instructions, $1. Felix Studio, Box 337, Duluth, Minnesota.

COMPLETE Cartooning Course! 50c. Westway Educational Service, Box 58, Los Angeles 35.

CARTOONISTS Magazine, Lessons, Plans, Markets! 25c Coin. Hartman, 2438 W. Lincoln, Nebr.

STUDENT'S Cartoons printed free literature. School of Cartoons, P.O. Box 3291, San Francisco 19, Calif.

BARGAINS. Books, courses. Quick Landscape painting, poster art-lettering, cartooning etc., supplies. Illustrated catalogue 10c. Art Book Shop, Arnold 1, Mo.

AMAZING invention teaches all purpose lettering in one week. Complete course and equipment 25c. Hobby Service, Summit St., Linden, N. J.

## 31 CHALK TALK-STUNTS

CHALK Talks. Laugh Producing Program $1.00. Illustrated Catalog 10c. Cartoonist Balda, Oshkosh, Wisconsin.



Copyrighted material

## 33 CHEMICALS AND APPARATUS

LABORATORY Supplies at Wholesale Prices: Chemistry, Biology, Physics. Catalogue, 10c. National Scientific Co., 2204 W. North Ave., Chicago. Established 1908.

WINN'S New Idea Champion Chemical-Kits, Apparatus-Outfits and Supplies for Students Home Experimenting. (Established 1931). Send 10c for catalog. John H. Winn, 124 W. 23rd St., Dept. 612, New York, N. Y.

LUMINOUS Paints will glow in dark. Six colors. Fairmount Chemical Co., 136 Liberty St., New York City 6.

CHEMICALS and apparatus for industrial, analytical, and private laboratories. Complete supply service for correspondence school students. Send 3c for catalog. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 7, N. Y.

HANDBOOK for Chemical Experimenters. Hundreds of experiments; illustrated; 50c. Experiment Booklet, 15c. Chemical Catalog, 5c. Reading Scientific Co., Reading, Pa.

NEW 36 Page chemical apparatus order book. Complete line of chemical glassware, apparatus and chemicals. Send 10c for this book. Standard Science Supply Co., 1232 N. Paulina St., Chicago.

CHEMICALS, Equipment, Books, Etc. Special Offers Free. Hallmark Technical Supply Co., Jamestown, New York.

STUDENTS' Laboratory Supplies. Send 5c for catalog. Mel-Glo Chemical Co., 258 Fourth Ave., Brklyn, N.Y.

CHEMISTS—Chemical questions answered. Formulas, Analyses, Minerals. Platoz, 26 Erwin Place, New Britain, Conn.

LABORATORY supplies, chemicals, glassware, apparatus. Lowest prices. Pamphlet free. Meyer Scientific, 76-A Willoughby St., Brooklyn, N. Y.

CHEMISTS, Inventors, Home Experimenters: Laboratory Glassware made per your specifications. Write Glastube Products, 185 Acacia Ave., Hawthorne, Calif.

FREE Catalog: Chemistry, mineralogy, biology, optics. Tracey Laboratories, Evanston, Illinois.

CHEMICALS, ounce quantities, apparatus, catalog 5c. Fleischer's Laboratories, Everett 49, Mass.

AMATEURS? try our cutrate chemicals apparatus, premiums, catalog 5c. Kemic Supply, Box 14 Boulevard, New York 59.

## 36 COIN COLLECTING

FREE! Foreign coin, banknote and Coin Collectors' Illustrated Catalog to approval service applicants. Send 3c postage. Tatham Coinco., Springfield-D50, Mass.

LARGE Genuine Ancient Roman Coin, $1.00, Twenty different coins, 15 countries, $1.00; 50 different coins Allied Nations $5.00; 40 different coins defeated nations $5.00. Lists Approvals. Delmonte, 40 W. 18th St., New York 11.

20 DIFFERENT Coins $1.00. 20 different Bills $1.00. Oddehon, Box 482, St. Louis, Mo.

10 INDIAN Head cents, different dates also price list, 40c. Schultz, 1053¾ Richwood, Cincinnati, Ohio.

25 DIFFERENT Coins $1.00. Harry Elsholz, Box 9014B, Pittsburgh 24, Pa.

TWENTY different Indian head cents $1.00, pricelists 3c. E. Walton, 7 Water, Boston 9, Mass.

$5. to $500 EACH paid for hundreds of Old or Odd Coins. Send Ten Cents for Illustrated Coin Book, 4 x 6. Guaranteed Prices. 40 years in business. Get Posted. Coin Exchange 2, LeRoy, N. Y.

440 ANTIQUE Firearms:—5,000 Bargains: —Coins, Indian Relics, Cartridges, Minerals, Rifles, Swords, Fossils, Flintlocks, Carbines, Catalog with photographs 25c. Heike, Wenona, Ill.

QUICK Service; reasonable prices. United States catalog 10c. Foreign catalog 10c. Ben's Coin Shop, 72 W. Washington, Chicago 2, Illinois.

THREE foreign coins, two foreign bills and price list all twenty cents. Ralph Hirschberg, 23 Waverly, Oceanside, N. Y.

FREE! Free! Free! Colorful, picturesque Japanese 5-sen and 10-sen notes! Current issue. Uncirculated. Genuine. Absolutely free with order for large surprise packet of Japanese Philippine-Invasion currency. Exceptional value! Note: Hard-to-get 1000 peso ($500.00) note included! You'll be amazed! and pleased! Only $1. Supply limited. This offer cannot be repeated. Order now! Stewart Byers, Box 187, Rayville, La.

RINGLING script 3 issues 45c; Confederate & Mexican bills; tax-tokens. Free lists. Badger Coin Service, 743 N. 4th St., Milwaukee 3, Wis.

WILL Pay $10.00 Each For Certain Lincoln Pennies! Indianheads $50.00; Dimes $1,000.00. Catalogue 10c. Federal Coin Exchange, 6-PS, Columbus, Ohio.

50,000 COINS, Colonial, Confederate, Invasion Currency. Illustrated lists free. Nagy, 8-H South 18th, Philadelphia 3, Pa.

GENUINE Confederate bills; 5 different, only $1.00. DuBose, Box 993, Atlanta 1, Ga.

INDIANHEADS 3c each. Receive regular big price list 10c. Leo Greenstreet, Union, Mo.

## 38 CONSULTING ENGINEERS

RADIO-Electronics consultation, engineering design, model development, technical writing. R. E. Lovejoy, 712 Yuma St., S. E., Washington 20, D.C.

TECHNICAL Problems—Electrical, Mechanical, Civil—solved by Professional Engineers at a price You Can Afford. Write for Free estimate. Jacques & Findlay, Consulting Engineers, Zobel Bldg., Red Bank, N. J.

MECHANICAL Engineering and Special Machine Design for Manufacturers and Inventors. Paragon Engineering Corp. 4031 Goodwin Avenue, Los Angeles 26, Cal.

## 42 DETECTIVES

DETECTIVES—Work home—Travel. Experience unnecessary. Write, Wagoner P-125 West 86th, N. Y., N. Y.

DETECTIVE Training, Phillips Secret Service, 1917-C North Kenneth, Chicago 39, Illinois.

## 43 DOGS, BIRDS, PETS, RABBITS

ORIGINAL chin-chin Giant Chinchilla Rabbits. Valuable Fur. Delicious Meat. Easily Raised. Pleasant Pastime. Large Profit. Free Booklet shows amazing profits from small investment. Willow Brook Farm, R16C, Sellersville, Penna.

A LIVING with Rabbits and Cavies. Markets Waiting. Magazine 10c. Book describing twenty breeds and magazine 25c. Book and magazine (monthly) one year 50c. Address Small Stock, Dept. 5, Pearl River, N. Y.

RAISE Birds For Us. Canaries, Love Birds, Finches and others. Interesting, profitable spare time work. Breeders supplied. Catalog and instructions free. Universal Aviaries, 1218 S. Michigan St., South Bend, Indiana "Successors to Tom & Ann.

RAISE Moneymaking Angora Rabbits. Wool $14.50 pound. Plenty markets. Particulars free. White's Rabbitry, Lawrence, Kansas.

ST. BERNARD Pups: Champion sired beauties. Franklin Young, R. 3, Riverhead, Long Island, New York.

RAISE Golden Hansters. Large profits. Booklet on raising, free. Hayner's Hamstery, Normal, Ill.

FREE: Booklet "More Sales", Thrilling Business Raising Canaries, Steady Demand. Full Instruction $1.00. Wollner, 1321-C Arch, Philadelphia, Pa.

STANDARD Rabbit Journal, Milton, Pa. 3 years $1.00. Sample dime.

RAISE Guinea Pigs. Make money at home. Big demand. Booklet free. Taylors Cavy Farm, Hapeville, Ga.

RAISE Diamond Seal Rabbits. We pay $25 to $50 each. Literature 10c with Hutch plans $1. Automatic cleaning, feeding, watering. 31 Drawings. Hansens Rabbitry, 1347 Miller Ave., Salt Lake, Utah.

MAKE your living plucking Angora rabbits. House of Angora, Springfield, Ill.

ANGORA Rabbits—Valuable wool! Giant chinchillas—luxurous two-tone furs! World's most profitable rabbits. Raised anywhere. Finest pedigreed breeders supplies. Illustrated literature free. Grinsteads, Edwardsville, Illinois.

## 45 DRAFTING INSTRUMENTS

SAVE on drafting materials. Free catalog. Draftsmen's Supply Co., 32 North Wells, Chicago 6

ANYONE can letter expertly with Letterite. Letterite Co., Fort Washington, Pa.

## 46 DRAWING & ART SUPPLIES

PERSPEC sheets simplify drawing; lines disappear. Send dollar. Herman Rueger, Lancaster, Pa.

## 47 EDUCATIONAL AND INSTRUCTION

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Co., Chicago 5.

"HOW To Break And Train Horses"—A book every farmer and horseman should have. It is free: no obligation. Simply address Beery School of Horsemanship, Dept. 585, Pleasant Hill, Ohio.

NEW 16-lesson "Crime Solving Course" trains you at home for well-paying Detective jobs. Write Chester A. Richardson, Greenville 1, Miss.

WHY Don't You Write? Writing short stories, articles, etc., will enable you to earn extra money. In your spare time we teach you to write the way newspaper men learn—by writing. Free "Writing Aptitude Test" tells whether you possess the fundamental qualities essential to successful writing. Veterans: This course approved for Veterans Training. Write today! Newspaper Institute of America, Suite 566-E, One Park Ave., New York 16, N. Y.

MIND Asleep? I'll speed it up. Tibolt Ph.D., 13A Phila. 20.

FOR an extremely profitable lifetime business, operate a Collection-Credit Bureau. Easily learned. Write Cole & Associates, Syracuse 2, N. Y.

BE A Detective—Send for price list of self-instructional courses at reduced prices. Perkins Publications, 300-C, Brandeis Theatre Bldg., Omaha, Nebr.

MATHEMATICS: Key To Success. Learn by New Home Study Methods. For trades or professions. Also reviews. State Education and kind desired. New Home Study Methods, P.O. Box 51, Flushing, N. Y.

USED Correspondence Courses, Educational and Technical Books bought, sold, rented. Free Catalog. Educational Exchange, Henagar, Ala.

CLINICAL Laboratory Technicians in great demand. We train you in your spare time, in your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-B, Austin 5, Texas.

GOVERNMENT Jobs: My self-preparatory, home-practice tests, with Keys help one make better grade in exams. Write, Ozment's School, 79, St. Louis, Mo.

GET in business for yourself! Learn fascinating Credit-Collection Agency Business by Correspondence. Many earn $5000—$15,000 annually. Write for Free Bulletin. Franklin Credit School, Dept. 102, Roanoke 7, Va.

BOOKKEEPING Course—$1.00. Spradlin Sales, 2204 N. L., Fort Smith, Arkansas.

LOCKSMITH Course. Lock-picking, key-fitting, etc. $1.00 prepaid. Miller's Key Shop, Canadian, Texas.

HYPNOTIZE Anyone. Secrets revealed. Learn psychotherapy. Exciting hypno-analytic experiments. Stop smoking, drinking, insomnia, stuttering, nail-biting, nervousness. $1.00 postpaid. Mohr, 71-01 35th Ave., Jackson Heights, N. Y.

POWERFUL Mental Telepathy. Practical, free literature. Elgin, 912 Benton, Nashville 4, Tenn.

LEARN Russian at home in 100 hours. Complete course, $1.50. E. Lerner, 15 E. 208 St., New York 67, N. Y.

FOOD sanitation. Learn for profit, protection. Certificate awarded. Free details. Institute Sanitary Science, 2385-B Edgewater, Los Angeles 28, Calif.

QUICKLY prepare for electrical examinations with the Electrical Quiz Book. An easy way to brush up on electrical knowledge. Price $1.00. Quizbook Co., Dept. A, 603 Brighton Beach Ave., Brooklyn 24, N. Y.



Copyrighted material

ASTROLOGY: Read Your Future In The Stars. Insure Happiness. Success Wonderful Results. Ann Curtis, 3439 S. Michigan Ave., Chicago, Ill.

RESORT hotel positions. Winter and Summer. South and North. Beginners instructed. Lee Hotel Institute, 7 Water St., Boston.

AMAZE with supermemory! Facts, figures, names stick like burrs. Write B-17, Thor Books, Box 1210, Chicago.

PSYCHOLOGY teaches about mind. Biology teaches about body. Bio-Psychology teaches about powers of mind over body. Use powers subconscious mind. Select proper vocation. Grow. Broaden education. Develop personality. Control emotions. Succeed. Correspondence. Dept. P, Taylor School of Bio-Psychology, Chattanooga 1, Tennessee.

SUPERSTITIONS Old and New Interesting Booklet 50c. P.O. 342, Mishawaka, Indiana.

"BIBLE Studies" 70 Lessons 25c. Bulletin, Box 87-S, Station H, New York 25.

ENJOY Health! Become Professional Acrobat. Free Health Information. Write! Knoff, 2154SA N. 52nd St., Milwaukee, Wis.

KNOW—"How to Drive Smoothly". Save yourself from accidents. Develop ability and confidence easily from illustrated, tested self-instructions. Excellent for Learners. $3.00 Postpaid. The Brown Driving System, Box 105-S, Hill Station, Harrisburg, Pa.

ARCHITECTS, Engineers new handy pocket table makes Slide Ruling The Measurements easy, fast, efficient. Ask for Table 18 and Free booklet on Engineering Standards. 25c. Watson Imagineering Co., Dallas 9, Texas.

U.S. Government Jobs! $1506 to $2650 year. Many examinations in next few months unusual opportunity! Prepare immediately at home. Full particulars Free. Write today. Franklin Institute, Dept. R23, Rochester, N. Y.

## 49 ELECTRICAL SUPPLIES & EQUIPMENT

BROKEN—Burned out Electrical Heating elements quickly repaired. Use new amazing Nichrocite Paste, simply overlap ends and turn on current. Family size $1.00 bill. Satisfaction guaranteed. Armstrong Mfg., Box 861-Y, Minneapolis, Minn.

ELECTRIC Pencil: Writes—Engraves all Metals. $1.00 postpaid. Beyer Mfg., 4515-C Cottage Grove, Chicago 15.

4 ALNICO Magnets $1.00. Lift 2½ pounds! Satisfaction guaranteed. Ronald Eyrich, Box 849, Milwaukee, Wis.

NOW—Repair your own electrical appliances with Chanite Self-welding, Electrical Heating, Element Flux. Instructions, delivered, price $1.00. Stick Form 25c each $2.00 dozen. Chanite Sales Company, 914 South Main, Fort Worth, Texas.

TELEGRAPH signal set. $1.00 Postpaid. Other electrical items. Talley's, Charlotte 2, N. C.

ELECTRIC Fans? Make your own. 16 in. correctly balanced Aluminum Fan Blade ½ in. Bore, ideal on any size motor 1/6-1/3 h.p. $3.50 18 in. all welded guard adjusted to fit 4 stops on motor $3.00. Adjustable floor standard, 4-8 Ft. height, rigid, sturdy $9.00. Table Standard, universal, fits any motor base, $3.75 Prepaid anywhere U.S. 25% deposit on C.O.D. shipments. Dealers write, Ted Riseman, 1461 N. 3rd St., Springfield, Ill.

MAKE Your Own Automatic Electric Water Heater. Save 75%. Sell to others, big profits. Easy guaranteed plans $1. Information free. Write, Crane Electric, Eugene 3, Oregon.

ALNICO Magnets, immediate delivery. Terry Sales Co., 3726 S. Detroit Ave., Toledo 9, Ohio.

## 50 EMPLOYMENT SERVICE

INTERESTED Foreign employment? Thousands jobs throughout world. Names and addresses over 200 firms with sample application $1.00. "We search the world" Wonder-World Research Bureau, Box 731, Gladewater, Texas.

AIRLINE Jobs! Huge demand for men, women. Foreign countries, U.S. Airlines Personnel Manual explains Opportunities, Qualifications, Salaries. Addresses leading foreign and domestic airlines. Price only $2. Aeronautical Publishing Co., Box 1051, Kansas City, Mo.

## 51 ENGINES, MOTORS, ETC.

WINDING Data, listing 225 motors, single and three phase, $1.00. Motor Data, Box 7631, Kansas City 3, Mo.

COMPARE our catalogue on engines &c 10c. Howard-P3, 2417 N. Ashland Ave., Chicago 14, Ill.

MOTOR winding tester, indicates burned out or partly shorted coils in single or three phase motors, indispensible for repair men. Send for bulletin. Motor Industries, Quincy, Ill.

SELSYN motors, Write for illustrations, description, etc. J. A. Weber, 150 Maple, Hershey, Penna.

150 AMPERE generator for welding $47.50. Extra flexible cable, 8 ft. lengths $2.75. Other bargains. Butler Electric Company, 1885 Milwaukee, Chicago 47.

## 52 FARMS, OTHER REAL ESTATE

OZARK Lands for all purposes. Actual River frontages. 5 acres $90.00 and upwards. Free list and literature. Hubbard, 424P Minnesota Ave., Kansas City 4, Kansas.

GOOD Farms — Ranches, Washington, Minn., Montana, Idaho, Oregon, North Dakota. Dependable crops, favorable climate. Write for literature, lists describing typical postwar farm opportunities. Specify which state. J. W. Haw, 120 Northern Pacific Ry., St. Paul 1, Minn.

OZARK farms. Large list free. E. Frank, Mountain View, Mo.

COUNTRY Homesites $55 up. Beautifully wooded. Write Mr. Armstrong, Shook, Mo.

STROUT'S Green Farm Catalog—over 1300 bargains—Maine to Florida, west to California, Oregon & Washington. Write Today for this big Book. Mailed Free. Strout Realty, 255-ZB 4th Ave., New York 10, N. Y., 7 So. Dearborn St., Chicago 3, Ill., 453 So. Spring, Los Angeles 13, Calif.

WISCONSIN Minnesota water frontages, $5 Down, $5 month. Lottco, 3505 S. Hope, Los Angeles 7, Calif.

HOMESITES—$450 Convenient payments. California's finest Garden Spot. On Morro Bay's beautiful Shores. Wonderful fishing, hunting, boating. Fertile soil, soft water, temperate climate, congenial community. Free Literature. Richard Otto 6560-Z Hollywood Blvd., Hollywood 28, Calif.

WANT To Be Your Own Boss? A good farm in Canada is your answer. Low prices. Favorable terms. Drop a postal today, giving your preferences as to size and kind of farm, and province in which you are interested. Address H. R. Cresswell, Canadian Pacific, Montreal.

OZARK Magazine, 111-B, Eureka Springs, Arkansas. For homeseekers. Year, $1.00.

FREE Homes, farms, ranches, free stock range, in fertile, healthful, lovely Ozarks. Free literature. Write Barnsley, Ozone, Ark.

WRITE for Ozarks Bargains Now. Hooper Real Estate, Sparta, Mo.

A SIX Room House, $2800.00 Complete, Ready for You to Move in. See ad on page 251.

## 55 FIELD GLASSES, TELESCOPES, ETC.

TELESCOPES, microscopes, binoculars, lens kits. Catalog free. Brownscope Co., 24 West 45th St., N.Y.

REAL 17 power telescopes $3. United, 2309-Z Lawrence, Toledo, Ohio.

TELESCOPES 18 inch 2-section 8 power, precision ground, polished lenses. Individually packed $1.50. 36 inch 3-section 17-power, precision ground, polished lenses including carrying case $2.50. Postpaid. Criterion Co., Dept. PS, 327 Trumbull St., Hartford, Conn.

ASTRONOMICAL telescopes, Microscopes, Cameras, Binoculars, Books: Bought, sold, repaired; Lists 10c; Specify instrument wanted. Rasmussen and Reece, 41 Market, Amsterdam, N. Y.

BUILD Your Own Reflecting Telescope Copy of Instructions 10c, Catalog Free, Mayfloor, Katonah, N. Y.

REFLECTING Telescopes, complete. 3½" diameter, equatorially mounted. View planets, stars, $19.75. Write Skyscope Co., 475-5th Ave., New York.

TELESCOPE 17 Power $3.00. Candid Cameras $3.98. Cardone's, 1324 Sheffield, Pittsburgh 12, Pa.

TELEPHOTO Camera, over four feet long, easily made. Trifling cost. Telephoto lens and instructions $2.00. Instructions alone, 10c. Carl Jamer, Box 494, Manorville, N. Y.

COMPOUND microscopes easily made. Trifling Cost. Lenses and instructions 50 X (50 diameters magnification) $1.00. 50 X and 200 X $2.00. 50X, 200X and 400X $3.00. Instructions alone 10c. Carl Jamer, Manorville, N. Y.

POWERFUL astronomical telescopes easily made. Trifling cost. Lenses and instrutions 100X and 400X $4.00. Instructions alone 10c. Carl Jamer, Box 494, Manorville, N. Y.

PORRO Prisms 1⅜" x 15/16" oval face. Manufactured by world-famous opticians for army and navy 8 x 50 binoculars. Rejected for slightly chipped edges. Outstanding bargain! 30c ea., 4 for $1.00 postpaid. No c.o.d. Remit with order. Ross, 70 W. Broadway, New York 7, N. Y.

## 56 FRUITS AND FOODS

WHEAT Germ Unexcelled quality 2½ lbs. $1.00 postpaid. Health-Wheat Co., Rochester 8, N. Y.

## 57 FOR THE HOME

PLASTIC House Numbers, Modern Design —Color Black. 10c. Postpaid. Send coin or money-order. Midwest Plastic's, 217 Bates Ave., St. Paul 6, Minn.

## 58 FOR INVENTORS

RANDOLPH & Beavers, Registered Patent Attorneys, 340-E Columbian Building, Washington, D. C. In order to Protect your invention and reap the reward that should be yours, Patent your invention without Delay, and at the same time have Rights to sell as Manufacturers convert to Civilian Production. Write for Information and Record Form To-day.

INVENTORS: Avoid unnecessary expense. Write for free booklet explaining how our Consulting and Advisory Service can assist you in deriving greatest profit from inventing. Institute of American Inventors, Dept. 30-A, 1926 Eye St., N.W., Washington 6, D. C.

INVENTIONS Having profit possibilities in demand by specific manufacturers, cash or royalty. Free descriptive booklet, protective disclosure form, references, and how to safely disclose an invention for sale, upon request. Invention Reporter, 3A-11106 S. Longwood Dr., Chicago 43.

CASH for practical ideas and inventions. Mr. Ball BB-9441 Pleasant, Chicago.

INVENTORS—Take prompt steps to protect your invention. Delays are dangerous. Get new Free Book, "Protect, Finance and Sell Your Invention," and "Invention Record" form. Preliminary information free. Reasonable fees. Conscientious counsel. Easy payment plan. Learn how to protect and sell your invention. Write us today. McMorrow, Berman & Davidson, Patent Attorneys, 143-C Atlantic Bldg., Washington 4, D. C.

WANTED: Practical Inventions. Inventors Exchange, Research Division, D6, Hartford 1, Conn.

INVENTORS: Learn now—without obligation—how to protect and sell your invention. Write for free "Record of Invention" form and complete instructions for making disclosure and establishing date of your invention. We also send our new free "Patent Guide for the Inventor", containing complete information about patent procedure and how to sell inventions; giving illustrations of many successful inventions; over 150 basic mechanical movements. We assure you prompt, confidential service. Delays may be dangerous. Write today for your free "Patent Guide" and "Record of Invention" form. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 62A-E Adams Building, Washington, D. C.

INVENTORS: We design and market your idea or product. Gadget Designer, 725 Walnut St., Room 23, Phila. 6, Pa.

PATENT Office searching exclusively. Prompt, confidential service assured. Invention protection form free. Write Raymond L. Smith, Patent Searcher, 410-S Bond Bldg., Washington 5, D. C. (Former U. S. Patent Office employee.)

READ Pitfalls For Inventors $1.50. Inventors Hobby Club, Box 827, St. Louis 1, Mo.



Copyrighted material

## 59 FORMULAS, PLANS, ETC.

137 MONEY-making plans, also formulas for salable products. Descriptive booklet free. Elite Co., 220-A Grand St., N. Y.

FORMULAS—All kinds. Latest money-makers; literature Free. KemiKal, Park Ridge, Ill.

MAKE Real Money selling spectacular Bubble liquid. $1.00 brings Formula. Northwest Specialty "B", 7926 46th Ave. So., Seattle 8, Wash.

ANY Formula 30c. Send 15c for sample Formula and List. Formula, Box 301, Hamilton, Ohio.

COUNTLESS opportunities to be your own boss! This big illustrated instruction book tells how. Over ten thousand helps, ideas, secrets, recipes, formulas for quick action. Do what hundreds of others have done without experience. $3.50 postpaid. Foreign $3.85 postpaid. (C.O.D. U.S.A. only). Adams Brown Co., Dept. 125, Chestnut Hill 67, Mass.

FIFTY formulae, recipes for one cent. Literature free. Pauline, 924a Southern Blvd., Bronx 59, New York.

NEED Chemists? Formulas. Analyses. Ideas. Consulting Scientific Co., Swarthmore, Pa.

METALLIZE Anything, including Baby-Shoes, Complete, Illustrated. $2.00. Metallizer, Box 8087 Dormont, 16, Pa.

MODERN manufacturing formulas. Everything including plastics, compositions, mold materials. 20c up catalog free. Houdelette, E. Wareham, Mass.

ICELESS Ice! Colder; Cleaner; Cheaper. Instructions, 25c. Duffy, A28, Covington, Ky.

LUMINOUS Paint Formulas. Six colors $5. Melmar, 11130 Parnell, Chicago 28.

24 FORMULAS for 50c. Individual trade formulas given and questions answered at $1.00 per formula. Satisfaction or money back. Box 491, Tradesearch, Richmond 4, Va.

ANY Formula or Recipe supplied $1.00. Interstate Laboratories, Dept. A, 1515 Oriental Blvd., Brooklyn 29, N. Y.

GET Our List of New Long Profit Formulas. Alliance Sales Co., Box 568, Alliance, Nebr.

FIVE skin cream formula. Inexpensive. Easily prepared at home. Particulars. Stamped envelope. Box 324, Denver, Colo.

FORMULAS—Latest, best Analysis. Literature free. E. Belfort, Engineering Building, Chicago 6.

MEDICAL—Cosmetic and Industrial Formulas Developed. Chemical analysis. Finest. For information write Duncan Laboratory, 1614 S. 14 St., Birmingham 5, Ala.

500 TESTED moneymaking formulas—13c chemists, Box 113-B, Buffalo, Sta. G, New York.

MANUFACTURE your brand cosmetics. Equipment unnecessary. Formulas, instructions, advice. Write: Alamo Formula Agency, 1716 So. St. Mary's St., San Antonio 3, Texas.

## 60 FROG RAISING

TADPOLES make money Booklet 25c Complete illustrated book $2.00. Chariton Corp., Century Bldg., Chicago 4.

"FROG Raising!" New book tells how. Marlboro House, 1035 Marlborough, Detroit 15, Michigan.

## 62 FUR FARMING

ORIGINAL Chin-Chin Giant Chincilla Rabbits. Valuable Fur. Delicious Meat. Easily Raised. Pleasant Pastime. Tremendous Demand. Small Investment. Large Profit. Willow Brook Farm, R16, Sellersville, Pennsylvania.

## 63 GAMES, ENTERTAINMENT

TRIPLE-Deal. Copyrighted playing card rules. 10c, P. O. Box 842, Denver 1, Colorado.

NEW Home Model Coin Machine for den or recreation room. Fun Maker. Money Maker. Fruit Reels. Automatic payout. Webb Distributing Co., Dept. P4, 6 S. Kedzie Ave., Chicago 12, Ill.

YOU Bet! A change for Young and Old. Complete rules and instructions. Play "Watch The Blue Room"—$1.00. Viviani, Marseilles, Illinois.

AT Last: A sensationally new universal game. It's exciting, it's educational. Can be played in any language. Develops the vocabulary, increases knowledge of mathematical and chemical formulas. $1.98 Postpaid. Lexigraph Co., Suite 915-B, Dept. 3, San Francisco 8, Calif.

THE Number Teacher. A child's educational game. Addition subtraction made easy. 10c. M. Wellhouse, 1212 Bernal, Burlingame, Calif.

GIANT Kites 6 foot. Complete with twine and reel. $2 postpaid. Albert Bachand Co., North Adams, Mass.

"DICE Games—How One Man Beat Them." 12-page true story 25c. Henson, Apt. 3A, 2942 Wayne Ave., Kansas City 3, Mo.

## 64 GARDENING

AMAZING Silverton Soiltester brings Garden Success! 35c. With three 25c plant hormones, outfit, $1.00. Silverton Laboratories "S", Toms River, N. J.

GROW Plants Without Soil! Attention—Botany Students and Teachers Hydroponics Manual and Chem-Kit. Send $3.49 to: Heilmann Products, 25 Cooper St., Bergenfield, New Jersey.

## 64-A GENEALOGY

TRACE Your family history with "Guidex"! Literature free. Family Guidex, P.O. Box 829, Annapolis, Md.

## 68 HELP WANTED

OPPORTUNITY of lifetime supplying DDT and other profitable products to farmers. No experience or capital required. Must have auto and good references. Permanent. Write or wire McNess Co., Dept. 713, Freeport, Ill.

WANT a better job? Do you want the job you dream about? Write George Savers, Myoma Village, Box 139, Mars, Pa.

EXPERIMENTERS Demonstrate Jet Propulsion, Helicopters to the public. Rush name for circulars. Shea, P.O. Box 33, San Lorenzo 50, Calif.

## 69 HIGHGRADE SALESMEN

LATEX Salesmen: Send $1.00 for salesmen's sample kit. Brings $6.00. Big savings on latex. Wholesale prices. Send order today. Leo Service, P.O. Box 1267, Roanoke, Va.

## 70 HOBBIES, COLLECTIONS

JEWELRY stones removed from rings, etc., 100 assorted $2.40; 50 large ones $2.40. B. Lowe, Holland Building, St. Louis 1, Mo.

COLLECT colorful Army Patches. Pictures, Prices and sample patch only 10c. Insignia Mart, 703 Broadway, N. Y.

INVENTING can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors, Dept. 30-E, 1926-Eye St., N. W., Washington 6, D. C.

UNUSED Match Book Covers. 100 all different $1.00. 35 Royal Flash Covers $1.00. Free list. Charles Edelman, 1311 P East 84, Cleveland 3, Ohio.

"WHO'S Who In Hobbies?" Men, Boys: Get your name and hobby in new directory. Address Inquiries: Box 91, So. Orange, N. J.

"METAL Work"—book shows how to do spinning, inlaying, cutting, etching, plating, etc., in metal. A great hobby. 192 pages, 450 pictures, $2.00. Popular Science, Dept. 56-C, 353 4th Avenue, New York 10, N. Y.

SOMETHING to swap? Advertise it free. Hurry! Henshaw, Bondville, Vermont.

LEATHER Scraps six pounds $2.00 three pounds $1.00. Book on leather-craft ideal for hobbyist "Applied Leathercraft" $2.75. Northern Supply Co., Dept. A, Sheboygan, Wis.

EXCHANGE duplicates. Swappers everywhere. List 10c particulars free. Box 2166, Denver 1, Colorado.

## 71 HOME CRAFTSMEN

WHITTLER'S—20 Patterns, instructions, X-acto knife, wood, $1.00. "Old Whittler," 1402 Charles, LaCrosse, Wis.

12 JIGSAW Silhouette Designs for Wall Pictures with Instructions $1.00. A. Devine, Silhouette Workshop, 144 School St., Watertown, Mass.

LUCITE—Plexiglas Prime quality 12" x 12" masked sheets 1/16"—$1.50, 1/8"—$1.75, 1/4"—$2.50. Add 10% Postage. Rods, Dyes Buffing compounds, Handee tool free listings. Craft Plastics, Box 129, Somerville, N. J.

TOY patterns. Circus wagons, trucks, carts, pull toys, etc. 35 patterns $1.00. Continental Homecrafter, 907 Birch, Eau Claire, Wis.

BUILD and sell Lawn Chairs, Plans $1.00. We tell you how and where we sell. Woodcraft, Danby, Vermont.

JEWELRY Accessories and Findings. Plastic and metal screw eyes, pinbacks, clasps, chains, rings, etc. Prompt shipping service. Complete lists 10c. Doremby Co., Chisholm, Maine.

CATALOG: Patterns plywood Novelty Furniture - Letters - Numerals - Plaques-Frames - Weathervanes - Silhouettes - Lawn Ornaments. 100 Books & Booklet's on Crafts & Hobbies, Picture Frame Mouldings, Tools, Large line Decal Transfers. Other lines. Hundreds articles finely illustrated. Write Wo-Met Shop, Ashburn, Georgia.

LUCITE New price pamphlets are ready, listing rods, sheets, dyes, earscrews, pins, etc. Colored stock now being shipped. Craft Service, 337 University Ave., Rochester 7, N. Y.

HERE is something new. Gracefully curved birds and fish easily made out of cowhorn. Complete instructions with drawings $1.00. H. Harrison, 14303 Strathmore, East Cleveland 12, Ohio.

"LUCITE" Beautiful creations in kits. All machined and cut ready for assembly. Materials, directions supplied. $1.00 and $3.00 specials. A-N Products Corp., 898 River Road, Edgewater, N. J.

KNOCKDOWN Cedar Chest Lumber Veneers Free Price List. Giles-Kendall, Box 435, Huntsville, Alabama.

BUILD own bench saw under $10.00. Complete Plans $1.00. George Drinkwater, West Barnstable, Mass.

CARVE Your Own Costume Jewelry. Five Patterns, Wood Blocks, Pinbacks, Only $1.00. O. Nerad, 532 Clinton, Oak Park, Ill.

MAKE Shell Butterfly Brooch, Floral Spray, Key Chain all for Dollar. Shell Catalogue Free. Dixie Shell Service, Lakeland, Fla.

ONE hundred twenty eight page completely illustrated instruction book. Chock full of ideas and projects in all plastics, now given with Kosto Plasti-Kit Number Three $5.00. This kit contains Lucite, Catalin, Dyes, Cements, polishing materials. No waiting. Kosto Plasti-Kits Dept. PS-14, 3263 M St., N. W., Washington 7, D. C.

LAWN Furniture: single Chair, Settee, Picnic Table with Benches, and Garden Bench. Four Plans $1.00. Woodcraft Plans, P. O. Box 136, Sedalia, Mo.

LEARN Carving Hobby—Detailed drawings, photograph, complete instructions, special sawed-wood profile. Kit $1.00 Postpaid. Carv-it Projects, Box 309, East Lansing, Michigan.

ANGWIN'S "Fuzzy-Wuzzys"—original wall plaques of most unusual construction and design. Nothing else like them. Easily sold. Sample and instructions for making, $1.00 postpaid. Angwin's Craft Shop, 1524 S. Pershing, Wichita 9, Kansas.

VIBRO-tools and other craft supplies. Free circulars. Nelson Company, Box 742, Madison, Wisconsin.

"WOOD Carving And Whittling"—book. Easy-to-follow instructions show how to carve figures of men and animals, furniture, etc. 270 pages, 150 pictures. $2. Popular Science, Dept. 56-C, 353 4th Ave., New York 10, N. Y.



Copyrighted material

"ELECTROPLATING"—book on how to set up and operate a complete home electroplating workshop. 260 pages, over 150 diagrams, $2. Popular Science, Dept. 56-C, 353 4th Avenue, New York 10, N. Y.

200 HERALDIC Pattern Designs (various sizes) $2.00. Samples 25c. IHB, P.O. Box 508, Annapolis, Md.

1000 TELUHOW Plans for Homeworkers. List 10c. C. King, E. Kingston, N. H.

COLORED Masked Sheets: Lucite, Plexiglas, Also pastel colors easily made with our special dyes. Send 25c for set of 12 sample colors plus full information and prices, refundable. Allcraft Prod. Co., 19 W. Columbia St., Hempstead, New York.

TOOLING leathers. Felt Projects. Authentic doll kits. Wool sheep scraps, 3 lbs. $1.00. Storr-Nelson Co., Rt. 2, Muskegon, Mich.

80 PATTERNS, 40 Lawn Ornaments, 20 Novelties, 20 Silhouettes, $1.00. List 100 other patterns. Modern Woodcraft, Saginaw, Mich.

LUCITE poker rack; build it yourself; sells for $12.50; send only $4.79 for completely machined parts; jigs, cement, polishing equipment, complete instructions free. Murribess, 1113 N. Genessee, Hollywood 46, Calif.

INTRODUCING, "Sadie The Surprising Seal." Amazing new action toy. Full size pattern, plus a pleasant surprise for profit minded Craftsmen for only 25c. Scully-Hall, 92-46 220th St. DE6, Queens Village 8, N. Y.

## 74 INFORMATION

DRUNKENNESS Is a disease which responds to treatment. Medical skill plus human sympathy prove successful with liquor and drug cases. 60 years experience. Write for free booklet. P. S. Nelson, The Keeley Institute, Dwight, Ill.

WHOLESALE Sources. Any item. Addresses Supplied. "Service," 1332 Findlay, New York City 56.

500 NEW things to buy to sell, or use. Write Chaffee, 308 Washington, Chicago 6.

## 75 INVENTIONS WANTED

WANTED—Patented, unpatented inventions having profit possibilities, all kinds. If will sell, reply immediately. Descriptive booklet, references, free. Invention Reporter, 3B-11106 S. Longwood Dr., Chicago 43.

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information, free. Institute of American Inventors, Dept. 30-C, Washington 6, D.C.

CASH for Inventions—Patented, unpatented. Mr. Ball, BC-9441 Pleasant, Chicago.

WANTED: Practical inventions for marketing through chain, drug and cigar stores. Particularly desire lighters, smokers' articles, etc., in plastic, wood or metal. Write Matt, 1412-GN, Great Northern Bldg., Chicago 4.

INVENTIONS Promoted. Patented or Unpatented. Write Adam-Fisher Co., 183-A Enright, St. Louis, Mo.

EARNINGS, $2,000 year easy; inventing simple items for special cash markets. Ideas only. No patents. Write Hendrickson, Argyle (8-A) Wisconsin.

INVENTORS Attention! Have you an invention patented or patentable of a novel electrical or mechanical device? Are you the owner of dies you wish to dispose of? If you have either or both give full particulars. We are a highly rated manufacturing concern with a nation-wide distributing organization. Your rights will be scrupulously respected. Lion Manufacturing Corp., Dept. B W, 2650 Belmont Ave., Chicago 18, Ill.

PATENT Office searching exclusively. Prompt, confidential service assured. Invention protection form free. Write Raymond L. Smith, Patent Searcher, 410-S Bond Bldg., Washington 5, D. C. (Former U. S. Patent Office employee.)

INVENTIONS and Designs Wanted At Once. Patented or Unpatented. Cash or royalty. John D. & Son, Dept. AA, 140 Spruce St., Bridgeport 5, Conn.

## 76 JEWELRY

JEWELRY findings, chain, links, etc. Metal and Plastic. Send dime for catalog. George Sassen, 154 Nassau St., New York City.

"JEWELRY, Gem Cutting, Metalcraft". Fascinating designs for hobbies and moneymaking opportunities. New, complete illustrated book covers cutting, polishing, mounting gems, metal, jewelry work, etc. 287 pages, $2.95 postpaid. Money back guarantee. We supply tools, materials at lowest cost. Modern Technical Book Co., Dept. M5S, 55 W. 42nd St., New York 18.

MANUFACTURE Costume Jewelry At Home For Profit, Hobby, Therapy. Free Wholesale Supply Catalogue. Instructions. Florida Supply House, Bradenton, Fla.

## 77 LANGUAGE OUTFITS

29 LANGUAGES by Linguaphone. Russian, Spanish, Portuguese—Direct conversational method for mastering any language quickly, easily, correctly at home. Send for free book. Linguaphone Institute, 54 RCA Bldg., New York, CI 7-0830.

## 78 LEGAL DIRECTORY

MEXICAN Law Practice, L. Gonzalez, Box 236, El Paso, Tex.

## 80 MACHINERY, TOOLS, SUPPLIES

SELSYN Motor Manufactured by Bendix, weigh 5 lbs. ea. 2 Transmitters, 2 Differentials, Set of 4—$25.00. Also Transmitters Manufactured by Bendix, Diehl Electrolux $7.50 ea. All operate on 110 Volt, 60 Cycle, A. C. Current. Suitable for Remote Control, Bean Antenna, Bingo Signalling, Wind Indicators, and many other uses. Special Bendix Type C.S. 1, Weigh 1 lb. ea. 28 Volt, D. C. Motor Will run on 15 Volt, A.C. about 2,000 R.P.M., $2.25, ea. Charges Prepaid on all items within the United States. Columbo Trading Company, Inc., 304 Canal St., New York 13.

DRILL GRINDER—Grinds drills to factory accuracy. Calipers with direct reading scales. Circle cutters. New Tool grinder. Lowest prices. Free literature. Factory, 811-A East 31st, Kansas City 3, Mo.

EXPERIMENTERS — 400 valuable new springs 75 kinds, numerous sizes, 10,000 uses, $2.00. Deluxe assortment, $3.00. Jumbo, $5.00. Guaranteed. Technico, Box 246, West Hartford, Conn.

EQUIP your home workshop quickly, efficiently, economically by building your own Mill, Shaper, Drillpress, Vice, Bandsaw, Jointer or other metal and woodworking tools. Lewis Castings and Materials are ready to finish, detailed Blueprints show how. Send 10c to cover cost of mailing new Catalog describing 23 items. Lewis Machine Tool Co., P.O. Box 116, Station A, Dept. S-64, Los Angeles 31, Calif.

BUILD Quickchange gear box for Craftsman 12", Atlas 10" lathes. Adaptable to others. No castings required. Complete drawings $3.00. Stevens Engineering, 2604 Military, Los Angeles 34, Calif.

GRINDER Kit, for all small hand grinders, contains 10 rotary files, five ball and five inverted cone type, 3/32 diameter shaft, 25 abrasive disks and mandrel, 6 chamois buffing heads. All for $2.00. Radioco, 1110 S. Marshall Bldg., Cleveland, Ohio.

FILES—big selection new files, assorted sizes and shapes 6" to 20" $1.95 per dozen. F.O.B. N.Y.C. D & H Industrial Supply Co., 1362 College Ave., Bronx, N. Y.

GEARS For inventors, experimenters, model makers, schools, work shops, laboratories, etc. Government surplus made of brass, bronze, dural steel and stainless steel. 12 matched pairs; 24 gears, bevel, spur and ratchet. List price $12.00, our price $2.50. 25 matched pairs; 50 gears, includes larger gears, also sets of worm gears. List price $30.00, our price $5.00. 50 matched pairs; 100 gears better assortment, including internal set and worm sets. List price $75.00, our price $10.00. Limited quantity. Order now. Write for our bulletins on ball bearings, rectifiers, Relays, Selsyns, Horns and government surplus materials. Met Exchange, 323 Canal St., New York.

MOTORS 1/5 HP $3.50 ½ HP $5.50 Ball Bearing New 27 volt DC Also works off 6 volt Battery ideal for grinder or fan motor for auto. Add 50c postage and packing. General Vacuum, 1439 Grand, Kansas City, Mo.

WAR Surplus, Machines, Tools, Etc. Rush name. Free literature. Wayne Engineering, Greenville 2, Ohio.

COMPRESSERS Air Motor and Tank 27 volts Universal ⅓ HP 11,000 RPM. Easily converted from 110 to 30 volts, weight 15 lbs., cost over $100.00, price $15.00, add 50c postage. General Vacuum, 1439 Grand, Kansas City, Mo.

MACHINE screws, drills, taps, dies, reamers, saws, mandrels, pulleys, bearings, drill rod, brazing wire, flux, Electric drills, Tools, etc. Catalogue 10c. Metlplas Supply Co., 1420 So. 16th, Maywood, Ill.

DRILL Grinder for Twist Drills $2.95, and other Craftsmen's tools. See ad on page 270.

SAW mandreals ⅝" shaft, ½" arbor, heavy duty bronze bearings, Total length 12" Precision made, expressly for craftsmen and hobbiest, $1.98, including pulley, 30 day guarantee. 10c brings item list. Wilson Manufacturing & Sales, 2233 Summit St., Columbus 1, Ohio.

BUILD It! Circular Saw, Drill Press. No castings, pipefittings. Two simple plans. Complete, $1. Western Colorado Sales Co., Dept. B, Box 584, Grand Junction, Colorado.

OPTI-LOCATOR accurately locates any machine tool spindle to workpiece for precision boring, etc. See ad page 266. The Benton Co., Dept. 351 S. La Brea Ave., Los Angeles 36, Calif.

## 81 MAGIC TRICKS, PUZZLES, ETC.

MAGICIANS', Gamblers' secrets exposed. Cards, Dice, Punchboards, Slot Machine. Catalog 10c. Book Co., Box 671, St. Louis 1, Mo.

500 TRICKS you can do! Douglas' famous Catalog of 500 Tricks, now only 10 cents. America's fastest service on magic for pocket, parlor, stage, professional, amateur. Douglas' Magicland, Dallas, Texas.

TRICKY Match Box, it turns around! It stands up! And it opens, most weird, uncanny magic novelty trick. Complete ready to do 25c. The Magician, 2463-K, Kensington Ave., Philadelphia, Penna.

WORLD'S largest professional magic shop keeps you in touch with latest tricks. To receive mailings send 25c for new catalog. Holdens, P-220 W. 42nd St., New York.

CONJURORS' Magazine, largest and most lavish monthly publication in the field of professional magic. Contains news, methods, elaborate illustrations, advertisements of leading magical dealers. Subscriptions available for limited few. $5.00 per year. Sample issue 50c. Conjurors' Press Inc., 148 Lafayette St., New York 13, N. Y.

MAGIC vanishing card. Throw it into air, it completely disappears, reproduce it later from spectators pocket. Easy to do. Complete 25c with magic catalog. The Magician, 2463-D Kensington Ave., Philadelphia 25, Pa.

MAGNETIC "Tricky Dogs" Sample 30c, dozen $2.00. "Hum-A-Zoo" Musical Novelty Sample 15c, Dozen $1.10. Kant, 323 Third, Pittsburgh 22, Pa.

"THE Fakir" Monthly Magazine for Magicians, Copy 25c, Subscription $2.00. Joseph Rachun, 114 Grand St., Brooklyn 11, N. Y.

ENTERTAINER'S Script catalog. Free! Kleinman, 25-31-M 30th Rd., Long Island City 2, New York.

MAGIC, Novelty, Catalog, Gift, 10c. Wencel, 2615 Evaline, Hamtramck 12, Mich.

BE a Magician. Large professional magic catalog of latest tricks. 25c. Ireland, F-109 North Dearborn, Chicago.

MAKE money with magic. Details free. Alfred Ellis, 76 Sagamore St., Winthrop 52, Mass.

VANISHING Quarter and Catalog 25c. Sterling Magic, 347 John R., Detroit, Michigan.

AMAZE and mystify your friends with highest quality magic. New catalogue 25c coin. Mazda Magic Co., Mt. Sterling, Ky.

TEACUP Magic: Fortunes appear, Tea Writing; Dime, Chem-Lab, Box 306, Harvey, Ill.



Copyrighted material

MAGIC Broadside Chock full of Tricks—Magic Package 25c. Magic Den, St. Louis, Mo.

THREE Card Monte .25c. Cigarette Vanisher .50c. Ten Trick Magic Kit $1.00. Kogel's Magic Novelty Co., 6751 B, Colbert St., New Orleans 19, La.

FIVE Amazing Tricks 25c, Mystery Chart Free; American Magic, Box 2485, Kansas City 6, Mo.

FLOATING Cigarette Trick — Cigarette Floats in Air, with instructions, Dime. J. Eastwood, Box 623 Parkersburg, W. Va.

FREE! Large Catalog of magical apparatus if you remit 25c for "Magic Is Fun". Robins Co., 152-F W. 42nd St., New York.

ADD this startling illusion to your show. No apparatus. Secret worth $10.00. Complete 10c. Trueco, 834 Summit St., Linden, N. J.

SLICK Tricks, funny joke items. Novelties, Puzzles. Latest catalog 10c. Sample Magic magazine included. Magic Fun, Box 35-H, Irvington 11, N. J.

MAGIC: Big 160 page Illustrated Catalog, latest Magic Goods, 25c. For over ⅓ century we have supplied Professional as well as Beginner. Chicago Magic Co., 2300 N. Mason, Chicago 39.

JIM DANDY New Wholesale Novelty Catalogue, 25c. Specialties, Bristol, Va.

MAGIC catalogue 25c. St. Louis Magic Studio, 406 Market, St. Louis 2, Missouri.

TRICKS. Secrets, cards, punchboards, etc. explained. Big illustrated circular free. Mack, Box 1278-P, San Francisco.

JUST Out! Guaranteed Fly-Killer, Laugh-Provoking Novelty, 25c. Daykin, 240-6th, Elyria, Ohio.

FREE! Twelve catchy tricks; magic catalog. Send stamp for postage. Lee's, 2231-S McKinley, Berkeley 3, Calif.

WORLD'S Greatest Card Tricks. Done with ordinary deck of cards—No skill—One trick and catalog free. Wonder Magic, 1265B Broadway, New York 1, N. Y.

## 81-A MAGNETS

MAGNETIZE your screwdrivers, tools, etc. Make magnets. New easy home and shop method. Nothing to buy. Send 50c for illustrated instructions. B & B Specialty Co., Box 2551, St. Anthony Falls Station, Minneapolis 14, Minn.

MAGNET, "Alnico" 4 oz. Horseshoe, powerful (lifts about 5 lbs.). $1.00 Postpaid. Ross, 66 W. Broadway, New York 7, N. Y.

## 82 MANUFACTURING

MODELS, small lot manufacturing, metals, plastics, etc. Milburn, Burlington, Kentucky.

INVENTIONS: Market study; Developing; Manufacturing; Models. J-M, Burlington, Ky.

2-3 TUBE amplifiers built to your specifications. Victoria Electronics & Supply Co., 1039 Memorial Ave., West Springfield, Mass.

## 83 MILK GOATS

MONEY from dairy goats! Booklet free. Introductory 5-month subscription to leading magazine 25c. Dairy Goat Journal, Dept. 668, Columbia, Missouri.

## 84 MILITARY INSIGNIA

FREE: 50 Military emblems, when joining "Insignia Club". Squadron, Foreign and regimental crests available. Price List, insignia guide 10c. Embroidered sample 5c. Hobbyguild, X 35 W. 32nd St., New York.

FOREIGN decoration ribbons, list, sample, 20c. Assorted insignia packet, folder, $1.00. Insigniacraft, 236-28th Ave., N. W., Calgary, Canada.

MILITARY Medals, Decorations, Enameled orders bought—sold. Collections Purchased. Kenneth Lee, 622 Security Bldg., Glendale 3, Calif.

## 85 MINERALS & PRECIOUS STONES

"GENUINE" Arizona Rubies (Garnets) Send quarter for packet. Mineral Specimens Co., Box 2651, Phoenix, Arizona.

GEMS, precious and semi-precious, all genuine, from world wide sources. Deal direct, no overhead, save money. Catalog 10c. Hill Co., Route 7-K, Salem, Oregon.

FOUR Beautiful Rough Gem Agates, $1.00. Smith, Box 422E, Albany, Oregon.

SPECIMEN—Hematite—Rusty—Ironore—Massive—$1.00. Jasper Levy, 97 Burr Ave., Hempstead, New York.

12 ROUGH Red Garnets 36 Gram $2.40. Cut Australia Green Garnet Brilliant $3.00. Finest cut optical prism 1¾ inch $3.00. Federal tax included. Ernest Meier, Church St. Annex, P.O. Box 302, New York 8, N. Y.

2 GEMMY Moss Agates $1. Rockhound, Box 555, Grand Junction, Colo.

## 86 MISCELLANEOUS

BOY Scouts—Campers, U. S. Army Surplus Used Equipment, Pup Tents $2.95, Canteens, with cover and cup $1. Mess Kits 75c. Packs $1. Complete set $5, includes cartridge belt. Samet Sales Co., High Point, N. C.

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Co., Chicago 5.

DRUNKENNESS Is a disease which responds to treatment. Medical skill plus human sympathy prove successful with liquor and drug cases. 60 years experience. Write for free booklet. P. S. Nelson, The Keeley Institute, Dwight, Ill.

WHITE Plaques to paint. Free price list. Graham Co., 4348 Bloomington, Minneapolis 7, Minn.

MECHANICAL Drawing Instruments—Veeco, 4 piece, compact, precision set, brand new in lined case, value $12.50, Special, $7.25—Deitzgen 11 piece Set, $10.00—Charvos 9 piece Set, $8.50. Army Surplus Slide Rules, slightly used, 75c each Hull Auto Compass, for accurate road direction, brand new, $2.50. Brand new folding valise knapsacks made of heavy olive green duck, heavily bound and reinforced, repellent to fire or water. Inside 3 large snap fastened pockets, heavy webbed straps, hand and shoulder handles, size opened 22" x 54", closed 22" rolled. Useful to Hunters, Boy Scouts, Hikers and for all traveling use. A $7.50 value, Special $2.25 postpaid. Forward money with order. No C.O.D. shipments. Public Sport Shops, 13 S. 16th St., Philadelphia, Pa.

MAKE Your own Plastoplate printing cuts. Simple, easy process. Plastoplate, Argyle 2, Wis.

UNUSUAL Novelties, samples 10c. Modern, Box 2, Station B, New York 2.

MEDICAL Laboratory Technicians in great demand. We train you in your spare time, in your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-S, Austin 5, Texas.

TRADE Magazines—Business, Vocational, Diversion. Classified Directory 3343 publications with complete addresses and subscription rates $1.00. Commercial Engraving Publishing Co., 34S N. Ritter, Indianapolis 1, Indiana.

BARBECUE grill, fireplace grate, rubbish burner combination; cast iron; $5.65 F.O.B. Descriptive circular. Parker, P.O. Box 175-Ensley, Birmingham 8, Ala.

HYPNOTIZE Anyone! Get the most perfect, easily learned, modern scientific course of "Genuine Hypnotism" in the world! Fully illustrated. Only $1.00. Money back guarantee. Fowler, Soldiers Field, Boston 63, Mass.

VETERAN making handkerchiefs, Scarves, etc. from captured German parachute silk. Sample handkerchief and list $1.00. Write: Pierre, Box 358, Grand Central Annex, New York 17, N.Y.

CARPENTERS—Fast! Accurate! Calculator. Simplifies everything. Postcard brings particulars. Box 1414, Great Falls, Montana.

BIG Mails, Samples, Bargains, Opportunities—10c. Dover Salesmart, 84 Monroe Ave., Dover, New Jersey.

FREE literature how to locate buried treasure and minerals. Fisher Laboratory, Palo Alto, Calif.

STAG. Book Matches. 10 for $1.00. Logan Novelty Co., Bellefontaine, Ohio.

PROSPERITY Class. Only $1.00 per month. Dr. Harold J. Jolet, 172 S. Cedar St., Farmington, Ill.

BRONZE Coat Roses make beautiful pins. Card for details. Stirling, 525 Iowa St., Beaumont, Texas.

FIRECRACKERS! Free Catalog. No Utah orders accepted. Vern's Specialties, Box 29-A, Sugarhouse, Utah.

DDT Midget Bombs! 3/60c. Rush order! Roberts, Box 1279-S, Joliet, Ill.

WOOLLY pandas. Handmade. 25c. Cado Products, Merchandise Mart, P. O. Box 3495, Chicago.

11¾ MILES of wire for $4.95. Has many uses. .0095 diameter. Breaking strain 8 lbs. Rustproof bethanized steel. Formerly Government assault wire. Your order filled immediately. Albert Bachand Co., North Adams, Mass.

ARMATURE Winders & Electricians. Sample coil and bender for A.C. & D.C. Armatures, Drawings, Instructions, $1.00. Main Box 445, Dearborn, Michigan.

KILL weeds with 2000 degree flame, kill poison ivy, stalks, seeds, roots. Can be used for irrigating, thawing, sterilizing, rock splitting. Endorsed by agricultural experts. 600,000 users. Sold in every Nation and civilized country of the globe. Valuable literature Free. Write today. Sine Equipment, S376, Quakertown, Pa.

ORIGINAL systems for office work. Also new system for bridge players; you can easily remember during play how many cards in each suit have been played. 32 page book, 25c in coin. O'Brien, 17 Hampton Pl., Brooklyn.

CEMADOBE brick will not melt, are durable, attractive, fireproof, soundproof, and dirt cheap. Make them yourself of earth and cement at a very low cost. Latest discovery in soil make them yourself of earth and cement at a very low cost. Latest discovery in soil stabilization. A veritable Godsend to those needing homes. No priorities needed. Easy to build with cemadobe. Now being done. All the know-how necessary is contained in booklet. Cemadobe, just off the press. 40 chapters and over 50 illustrations. Mailed for $1.00. Bob and Ed Williams, Dept. PSA, P.O. Box 775, Vallejo, Calif.

THE Lord's Coming! Get dozens free proofs. Write quickly. International Evangelism, Box 263-P.S., Duluth, Minn.

NEW Nylon Parachutes, 21x7 feet, cords, case, complete $5.69 Postpaid. Rainbow Silk Co., Decherd, Tenn.

SQUARE Dance calls, instructions, $1.00. Ozarkians, 111-N, Eureka Springs, Arkansas.

HOUSE construction, New type, 60% savings possible, send $1.00 for instructions. P.O. Box 713, Mobile 4, Ala.

GIANT Mails, leading Mail Magazines, Adsheets, Opportunities 10c. Harvey Teeple, Decatur, Indiana.

"NEW Plastic Nu-coat" is unbeatable for renewing shoes and leather articles—42 colors, enclose 35c coin. W. F. Niemier, Carrollton, Ohio.

HANDCRAFTED leathers billfolds $5.00 deluxe billfold keycase $11.00 secretaries $12.00 ladies beach bags $7.00 envelope bags $37.00 shoulder strap bags $45.00 unexcelled gifts refund Guarantee. Artcraft, Box 1522, Jackson, Miss.

DO you want to have fun and pleasure of becoming acquainted with Something Thrilling Under The Sun? How would you like to have the satisfying comfort of having abundant amount of extremely hot water, yes plenty hot enough to scald a chicken, 24 hours a day without a cent of fuel bill. Well, you can have all of this with the original investment costing very little. All you have to do is this, send for my plan "Something Thrilling Under The Sun" showing how simple and easy it is to build a New Modern Solar Water Heater. You can build it yourself quickly in your spare time. Price only $2.00 with order. Mark W. Munroe, Jr., Box 789, Quincy, Fla.

PHOTO Kit. Make your own snapshot prints. Everything furnished. No Darkroom or experience necessary. Order today. $1.50 postpaid. Godfrey C., Box 2203, San Antonio 6, Texas.

"ANT Hara-Kiri" Amazing Ant Suicide device! War-veteran's story explains fully. Use it Yourself! Folio sent postage-paid. Satisfaction Guaranteed! Send $1.00 Now! Anthony, Box 57A, Allston 34, Mass.



Copyrighted material

PLASTIC Kit beautiful Lucite cigarette box prefabricated ready to assemble, $1.98 complete. Halco Products, 505 Fifth Ave., New York, N. Y.

CUTTERS Dental burs assorted reclaimed job-lot, $1.90 per gross. D'Wolf, 1924 E. Hartlane, Philadelphia, Pa.

"JUMPIN' Beans" Live Mexican Postpaid —4 for 25c. John's Novelty Company, 1014 Mass. St., Lawrence, Kansas.

RECEIVE Mails, Moneymaking Opportunities, Samples, Literature. Your name in several mailing lists, 10c Rodgowski, 3415 Broadway, New York 31.

HARDENED Steel Pins Tapered full length, use as metal punch or scriber. Send 25c for sample. W. Scheck, 353 Shaler Blvd., Ridgefield, N. J.

CIGARS? Swell smoking, prices on request. S. & E. Co., Dept. PSM, Red Lion, Penna.

## 87 MODELS, MODEL SUPPLIES

MODEL Ship Builders! Are you looking for authentic, precision ship models? Send for richly illustrated fully descriptive catalogue in full color of famous ships of all kinds. Only 10c. Marine Model Co. Inc., Dept. C-16, Halesite, Huntington, N. Y.

SHIP & Yacht Model Fittings and blueprints. Hundreds of items to choose from. Send 25c for new illustrated catalog. A. J. Fisher, 1002 Etowah Ave., Dept. S, Royal Oak, Mich.

MOST complete Illustrated Catalog—"O-HO OO" Model Railroad Parts ever published. Send 5c for mailing. Selly, 1377 Gates Ave., Dept. 829, Brooklyn, N. Y.

SHIP Model and yacht supplies, complete large 64 page catalogue, 25c. Wm. Wild, 510 E. 11th St., New York City.

SHIP model kits and fittings. Complete line Fisher model yacht equipment. All Boucher, Fisher, Marine Model and Ideal Kits, fittings and blueprints at standard prices. Most complete stock in New England. Send 10c for price lists. James Bliss & Co., Inc., 220 State St., Boston, Mass.

CATALOGS (Illustrated) for Modellers! Airplanes; 60 page book on Solids. Features construction data, specifications, camouflaging, 15c. Railroads: 128 page 'HO' guide. Equipment, accessories, fittings, 25c (includes refund coupon). Send coin or stamps for each profusely illustrated catalog desired. Polk's "Nation's Leading Hobby House," 314-P Fifth Ave., N.Y.C. 1.

BIG illustrated model engine catalog 10c. Active Products & Supply Co., 53 W. Jackson, Chicago 4.

HI-SPEED miniature four cylinder steam engine. Assembled or partly finished engines in production. Stamp for circular. Inland Marine Co., 7817 Grove Ave., Webster Groves 19, Mo.

MODEL airplane kits, motors, supplies. Write for price list. Reggie's Hobby Shop, 3024 Knox St., Dallas 5, Texas.

WIZZ Electric Motor; Assembles in jiffy. Flashlight cell operates. All parts complete. Illustrated instructions. Send 25c, plus 5c postage. Ritro Co., 171S Deer Park, N.Y.

MODEL Airplane and Gas Model Mail Order Catalogue. Profusely illustrated. 68 pages. 8½ x 11. Catalogue includes model airplanes, gas models, solid models, gliders, gas engines, supplies, tools. For your copy send 25c (included refund coupon to General Modelcraft Co., Dept. S-4, 91-17 173rd St., Jamaica 3, N. Y.

"SHIP Model Making"—book filled with complete plans for making any type galleon, clipper ship, etc. Nautical glossary. 193 pages, 133 pictures, $1. Popular Science, Dept. 56-C, 353 4th Ave., New York 10, N.Y.

"MODEL Railways"—book with simple instructions for building, laying out, operating a complete model railway. 256 pages, 365 diagrams and charts. $2. Popular Science, Dept. 56-C, 353 4th Ave., New York 10, N. Y.

BRASS Gears and Model Supplies, send 10c for catalog. Pierce Model Works, Tinley Park, Ill.

BOAT Models. P. T., Cabin Cruiser, Speedboat. Free Circular. All Star, 2003 Lincoln Ave., Chicago 14.

MODEL Engine Catalog. Railroad Supplies, 25c. Refunded. Simonsen, P3054 Greenview, Chicago 13.

KITS for constructing Waterline Models of Missouri Class battleship, Essex carrier, Cleveland cruiser, Fletcher destroyer. Kits include plans, instuctions, and All Parts Ready for assembling. Free Illustrated booklet. Naval Ship Model Co., 58 Winthrop St., Taunton, Mass.

RAILWAY models, complete line. New Larger catalog HO and O gauge, 25c. Walthers 269 Erie Milwaukee 2, Wisconsin.

PROFIT sharing plan: Models—motors—supplies. List your needs. Taylor's Petoskey, Mich.

## 88 MONEY MAKING OPPORTUNITIES

DETECTIVES Earn Big Money. Experience unnecessary. Particulars free. Wagoner, P-125 West 86th, N. Y., N. Y.

LEARN Metascience. Remarkable drugless healing. No manipulation. No apparatus. Unbelievable simplicity and results. Inexpensive correspondence course. Write Metascience, De Land, Florida.

ELITE Collection describes 137 moneymaking plans; local, mail order. Particulars free. Elite Co., 220-A Grand St., N. Y.

MECHANICALLY Inclined Men—Own and operate general Appliance Repair shop. Complete, illustrated course shows you how. Welding, Refrigeration, Motor repair, How to get business, etc., all phases covered. Free literature. Christy Supply, Dept. 1463, 2835 N. Central Ave., Chicago.

100 AND more ideas make money home. Big profits. Large folder free. 20th Century Service Co., 505 Fifth Ave., New York.

EARN Money evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 2, Wisconsin.

RECEIVE Mails, samples, moneymaking opportunities, literature, steadily, one year, 25c, Zbiegniewicz, 147 N. 8th St., Brooklyn 11, N. Y.

$10,000,000 FREE—Annually, Prize Contests. Win Fortune. We Help You. Best Help Possible. Any Contest. Lowest Rates. Bulletin, Free. Cash Register, 210 Fifth Ave., New York 10.

PRIZE Contest Hobby pays off with free automobiles and contest gold. Here's how and where to get your share. National Contest Bulletin, Box 634-M, Grand Central Annex, New York City.

NOVELTY Manufacturing offers splendid opportunity to start highly profitable business. No expensive equipment, orders waiting, large profits, easily learned. Write to-day. Plastex Products, 127 Clement, San Francisco 18, Calif.

BUSINESS Opportunities. Stamp brings descriptive folder. Box 855-PS, Des Moines 4, Iowa.

"HOW to make money with Hobbies" send today for details of this interesting book. Stoll Specialty Service, 3103 P East Ninth, Joplin, Mo.

BUY Articles wholesale. Make money by mail. Formulas, Trade secrets. Literature free. Massey, 64 Sterling, Franklin, New Jersey.

START your own business! Big Money—manufacturing novelties, plaques, statuary. Catalog Free. Write, Bing Products, 88-BN Broad St., Boston 10, Mass.

EARN money at home! Thousands do! "Home Worker Magazine" tells how. Sample, 25c. Sizemore, Box 6, 4917 North Kostner, Chicago.

300 MAIL business starting offers monthly for 5 months. 10c. Thomason, 857-s, East Jessamine, Fort Worth 3, Texas.

$200 MONTHLY With camera! Forty money-makers with camera. Complete guide 50c. Frank Dickson, 808 Elizabeth St., Anderson, South Carolina.

MONEY-Making Opportunities in these big mails 10c. Dover Salesmart, 84 Monroe Ave., Dover, New Jersey.

FREE Literature upon request, describing many moneymaking plans. Island Mail Service, Box 162-F, Jamaica 4, New York.

ELECTRIC Clocks are everywhere you go, buildings, homes, parking-lots, factories. Repairs increasing. Our easy to learn course with pictures and drawings teach You how to repair these clocks. Electronic Supply Co., Box 2350-B, Houston 1, Texas.

GIGANTIC Mails—Trade Magazines—Name Listed 13c. Jackson, Newfoundland 4, Ky.

A $100-a-month hobby at home! No soliciting, no mail order, no meeting people. Easy, enjoyable pastime. Details, 25c (refundable.) Laura Dickson, 241-PS Main Building, Lander College, Greenwood, S.C.

WIN fame, success, security writing short stories, newspaper features. New, easy plan shows you how. Write today for exclusive details. Writer's Institute, 4-P So. 15th St., Philadelphia 2, Pa.

OPERATE your own mail order business. Details, Dime. Thomas, Box 1806, Providence, R. I.

"HOW To Make Money with Big Mails" booklet 25c. Frank J. Artz, 1060D Harding Dr., Toledo 9, Ohio.

WIN contest money. General Contest Bulletin shows how. Sample 25c. 1609-A E. 5th, Duluth 5, Minn.

UNFRAMED Color Pictures. Samples 10c. "Curtis," Box 1916-B, Denver 1, Colorado.

GOOD jobs, free fertile lands, obtainable in Latin-America. Also, profitable Mail-order Business. Interesting Literature, 10c Vallesm, 395 Broadway, New York 13.

MANUFACTURE Costume Jewelry At Home For Profit, Hobby, Therapy. Free Wholesale Supply Catalogue. Instructions. Florida Supply House, Bradentown, Fla.

NEED Money! Guaranteed Spare-time Mail Plan 25c. Nemsco, 1301A Commonwealth Ave., Allston 34, Mass.

MAIL order business, render a service to people that are ready prospects for the help you offer them. This class of people spend millions of dollars every year. No stock to carry. No experience necessary. Can be started with a few dollars. Send 25c today for complete plan. Specialty Service, 13 Princeton St., Rochester 5, N.Y.

FREE literature describes guaranteed home mailorder system. Write Albert Wilcox, PS32, Nicholls, Georgia.

"SECURITY Acres" and independence. Amazing Book Dollar, prepaid (refundable.:—Publishers, 5345-A Harper, Chicago 15, Ill.

MAILING Lists for every purpose, state your needs. Q service, 422 South Dearborn, Chicago, Ill.

BE your own boss. Our money making plans helped thousands—they can help you, free details—Sem Tem Service, 24 Wall St., Norwalk, Conn.

PAINT Figurines, Plaques. Circular. Progress Co., 4033 Chowen Ave., Minneapolis, Minn.

"HUNDREDS"—Home Moneymaking and Saving Opportunities from all over America. Write—National, 18900-S Cardoni, Detroit 3, Michigan.

PRACTICAL Moneymaking plans. Free literature. Goodrich, 16 Edgewood Ter., Longmeadow, Mass.

OPPORTUNITY SEEKERS? Book Buyers, Agents. Send Postal for interesting Offers. Lido Pacini, 187 Mated Avenue, Daly City 25, Calif.

## 89 MONUMENTS

WRITE For Direct Prices $14.00 Up. Freight Paid. Guaranteed. Free Catalog. Granite-Marble Factory, A49, Oneco, Fla.

## 90 MOTION PICTURES, SOUND EQUIPMENT

FEATURE sound programs—shipped anywhere $4.95 complete. Free Catalog. National Cinema Service, 71 Dey St., New York.

8-16mm SILENT-sound films. Complete rental library. All latest subjects. Free catalogue. (sample film 10c). Garden Film, 317 W. 50th, N. Y. 19.

TAKE finer movies. Professional instruction at home. Free Catalog. Motion Picture Institute, Birmingham 5, Mich.

BEAUTIFUL Kodachrome Slide and list, 25c. Art Slide Co., S-1, Canton, Ohio.

MOVIE Camera Films, 100' 16mm $2.50. 25' Double 8mm $1.25. Free Developing. Better Films, 742 NewLots, Brooklyn 7, N. Y.

COMPLETE 16mm. sound cartoons, good condition, $9.95. 100' used sound film, $1.00. We buy, sell, trade sound films. Big list available. Blackhawk Films, Dept. PS19, Davenport, Iowa.



Copyrighted material

BEAUTIFUL Kodachrome film subjects, 8mm, 16mm. Low prices. Big catalog, 25c. Projection length sample from "Waikiki Hula," $1.00. World in Color, Box 392, A, Elmira, N.Y.

MOVIE projectors bought and sold. List 10c. United, 2309-D Lawrence, Toledo, Ohio.

GUARANTEED Fresh movie film! Three spools double 8mm $3.45! Six spools single 8mm for Univex cameras $3.50! Processing free! Postpaid. ($1.00 deposit C.O.D.'s.) State camera make. Catalog. Eso-S, 4038 Broadway, Kansas City 2, Mo.

LEARN movie projection, management. Free catalog. Theatre School, Elmira, N. Y.

UNUSUAL 8-16mm. film subjects. Big Catalog with sample film, 10c. National Film Exchange, Sta. E-Broadway, Toledo, Ohio.

16mm MOTOR Driven projectors $16.00 postpaid. Sterling's, 679 Northampton, Easton, Pennsylvania.

UNUSUAL Movie! "Temptation." Featuring Beautiful Models. 50 ft—8 mm $3.00. 100 ft—16 mm $5.00. Fine Art Productions, Box 2084, San Antonio 6, Texas.

SAVE money. Buy—rent—exchange 8-16mm and sound home movies. Details for dime. Midland Film Exchange, Box 429, Oak Park 3, Ill.

UNUSUAL Home Movies: Travel, Adventure, Sports, News, War films. Many film bargains. Big 1946 Catalog and sample, Dime. Audet, Box 6520-AG, Philadelphia 38, Pa.

LEARN Professional Motion Picture Technique at home. Free Catalog. Motion Picture Institute, Birmingham 5, Mich.

A CHILD Is Born By Caesarean Delivery. The outstanding home movie production. Project it yourself free. Send postal card today. Preferred Film Producers, Hamilton 24, Ohio.

CAMERAS, Projectors, Films. Lists, free. (Art catalog, 10c). Box 337, Valley Stream, N.Y.

MAKE $8.00 to $10.00 net profit daily with your 8mm or 16mm projector. Write, Metcalf, 10806 So. Glenroy Ave., Chicago, Ill.

8mm, 16mm, 35mm films. Sample 10c. Lists Free. Paramount Films, Monmouth, Illinois.

MOVIE Camera Film-100' 16 Mim-$2.25, three rolls $6.00-25' double 8 mim. $1.25. Ambassador, 479-A Quincy St. Brooklyn, N. Y.

THIRTY Stars:—"Movies March Along", 16mm. $9.75; 8mm. $5.50. Catalogues. Irving Meginnis, 340-R West 29th, New York 1.

FILM—Processing Not included—100 Ft. Lengths. Double 8, Weston 6 $1.65; Weston 64, $3.95; Single 8, Weston 6, $1.15; Weston 64, $2.40; 16mm Weston 6, $1.55; Weston 24, $3.80; Weston 64, $3.90. Free Circulars. Fromader Genera, Davenport 5, Iowa.

8-16 mm FAMOUS Films, Projection Sample and catalog 35c. 16 mm Projector $15.50. Richardson Cinema Service, Wyoming 3, Pa.

"THE World's Greatest Passion Play", All sizes, Rent or Purchase, Write Hemenway Film, 33 Z Melrose St., Boston 16, Mass.

PROJECTOR 16MM. A. C. Motor Driven. Focusing Lens. With Lamp, 200 Ft. Reel. $15.50 Postpaid. Photo-Craft, Box 470-W, Jamaica 1, New York.

FILMS 16mm outdoor $2.50. Weston 24 $4.50 per 100! Free developing. ABC Films, B-111, Boulevard Station, NYC.

## 91 MOTORCYCLES, BICYCLES, SUPPLIES

LARGE stock Indian parts. Expert motor rebuilding. Indian Motorcycle Sales. Kansas City 1, Mo.

WHEELS, Tires, Tubes for Motor Scooters, Midget Cars, Wheelbarrows, and Industrial equipment. All sizes. Bicycle Parts, accessories. Largest stock in United States. Send dime for list. Cycle Transport Company, 1241 S. Michigan Ave., Dept. C, Chicago 5, Illinois.

HARLEY-Davidson service, parts, accessories, Buddy Seats, $17.75. Tandems for 45 Models, $12.50 Shipping paid (can be fitted to other models) Send $2.25 for Army Motorcycle Manual 10c for Bulletins—Knuth's Harley Davidson Agency, 2491 Fondulac, Milwaukee, Wis.

BOLENS Factory-built midget racer $40 complete; boys midget car less motor $8; twin-cylinder motorbike $35; Indian twin motorcycle $60; Harley $70; Motorscooters $35 up; Briggs-Stratton motors as low as $5. Over 1500 balloon tires for midget cars and motorscooters in stock $1.50 up. Parts plans. Mailorder only. Send 25c for Big War-Bargain catalogue Number 12 just out listing the above and almost 400 other motorized bargains. (35c by first class mail). Midget Motors Directory, Athens, Ohio.

PARTS Accessories Pistons, Chain Motors Transmissions Generators Rebuilt or exchanged. Allied Sales, Box 114, El Paso, Texas.

MOTORCYCLE Parts new and used. List 10c. Ballak, 811 N. 9th. St. Louis 1, Mo.

CHANGE your Bicycle to Electric or Gas Motorcycle. Write, T. M. McDonald, 837 Magnolia, Beaumont, Calif.

USE scrap parts and easily build your own two-passenger midget "Jeep" or speedy Scooter-Car (three wheel, two-passenger runabout, powered with small gasoline engine). Working plans for both vehicles only $1.00! Universal, 2671 Algonquin, Toledo 6, Ohio.

PROFESSIONAL Midget Racer, Motorscooter, Midget Roadster, and Midget Motorcycle. Plans, specifications for all four contained in illustrated handbook, 25c. Big list bargain priced used motors, motorscooters, Servicycles, etc., included free! Midwest, 3839 Drummond, Toledo, Ohio.

BUILD America's lowest priced motorscooter speedster! Complete plans, specifications, $1.00. Big list bargain priced used motors, etc., included free! Motor Supply, Box 1682-CS, Toledo, Ohio.

MOTORSCOOTER $10. Motor $3. Tires $2! Send 25c for big new catalog Number 912, just printed, listing scores of other sensational bargains in motors, wheels, motorscooters, motorbikes, Servicycles, tires, Etc. Associated, Box CS-1764, Toledo, Ohio.

MOTORSCOOTERS 1946 models. Immediate delivery. Write for information. Johnson, Route 1, Milford, Indiana.

BUILD Electric bicycle without gears; welding. Relay controlled. Plans $1. Klauss, 1369 Missouri, Pittsburgh 6, Pa.

MOTORSCOOTER Plans for boys. Speedy. Simple to build. Uses washing machine gas motor. $1.00. Strachan Scooter Shop, Howard 3, Kansas.

METAL disc, rubber tired wheels, for toys, wheelbarrows, wagons, scooters, etc. Sizes 8, 7, 6, 5. Axles available. United Wheels Mfg. Co., 11727 LaFayette Ave., Chicago 28, Ill.

GENUINE Moto-Scoot Parts. Complete wheels, tires, tubes, 4:00 x 7, 3:50 x 6. AMSCO centrifugal clutch. Windshields, side cars. All other parts and accessories. Write for parts list. Also genuine engine parts for Briggs and Stratton. Lauson. American Moto-Scoot Co., 1313-23 Carroll Ave., Chicago 7, Ill.

MOTORBIKE Manual. If you are anticipating the enjoyment and thrift of a Motorbike or Scooter, you should have these shop tested scale drawings, easy instructions and Motor repair information. May easily save more than the Manual cost. $1.00. Vecco, Post Office Box 124, Evansville, Indiana.

FLOYD CLYMER'S Popular Motorcycle Books: Motorcycles, How to Manage Them $1.50 Motorcycling Manual $2.00 English Motorcycle Service Manual $1.50 Speed, How to Obtain It $1.50 Sample English Motorcycling Magazine 50c Complete Plans build attractive Motor Scooter $2.00 Plans Electric Bicycle $1.50 all books postpaid. See our advertisement under Automobiles for Automobile Books. Clymer, Dept. B50, 2125 W. Pico, Los Angeles 6, Calif.

ENGLISH Motorcycle Magazine. Photographs, articles, advertisements interesting foreign motorcycles. Sample copy 50c postpaid. Clymer, Dept. B56, 2125 W. Pico, Los Angeles 6, Calif.

PLANS For attractive Motor Scooter $2.00 Electric Bicycle Plans $1.50 Clymer, Dept. B55, 2125 W. Pico, Los Angeles 6, Calif.

NUMBER Three Clymer Motor Scrapbook now ready. Entirely different from Editions One and Two. 250 early automobiles, motorcycles illustrated, described. Pike's Peak Racing History included in Floyd Clymer's story. $1.50. De Luxe clothbound $2.50. (Editions One and Two available same price). Clymer's Steam Automobile Scrapbook $2.00. All Postpaid. Clymer, Dept. B53, 2125 W. Pico, Los Angeles 6, Calif.

INDIANAPOLIS "500" Race History Book. 320 large pages, 2000 illustrations. Complete detailed information every event held Indianapolis Speedway since 1909. Year by year detailed results. $3.50. De Luxe edition red Du Pont Fabrikoid binding $5.00. Postpaid. See our ad under "Automobiles." Clymer, Dept. B57, 2125 W. Pico, Los Angeles 6, Calif.

## 92 MUSIC, MUSICAL INSTRUMENTS

SONG Poems Wanted, for musical settings. Send poems for Free Examination. Write for Free Instructive Booklet outlining Opportunities. United Music, Salem 12, Indiana.

CROSS-Note Puzzles Music-Lover's Delight. Interesting, Instructive, Original. $1.00. P.P. M.B. Guarantee. D'Aleo, 190 Sackman St., Brooklyn 12, N. Y.

VIOLIN "Stradivarizing Plan." $2.00. Guaranteed—refund. Patmor Tonepost, Zion, Ill.

ADVANCED Popular Piano Course. $1.50. William Otto, 4215 Park Ave., Union City, N. J. Sample Lesson 10c.

USED Phonograph Records, 10 or 10,000. State Your Requirements. Olin Milner, 335 McDaniel St., Atlanta, Ga.

HAWAIIAN Guitar Chord Chart $1.00. Over 650 Chords in A-E7th-C- -B-11th-Notes and Diagrams by Sol Hoopii and Dick McIntire. Best for arranging. Fator's, 935 W. Santa Barbara, Los Angeles 37, Calif.

WANTED Coin operated old-style musical instruments cash. Bobs, 112 E. Seventeenth St., Los Angeles 15, Calif.

PLAY Piano by ear! Lesson, 25c. Musician's Studio, 116 W. Anaheim, Long Beach, Calif.

## 95 OLD GOLD, WATCHES, ETC.

WANTED—Old or broken jewelry. Cash paid immediately. Mail gold teeth, watches, rings, silverware, diamonds, spectacles. Satisfaction guaranteed or merchandise returned. Information free. Rose Smelting Co., 29 E. Madison, Chicago, Dept. Y.

## 96 OLD STAMPS WANTED

WHAT have you to offer? A collection? A "Shoe Box" accumulation? Anything in stamps. We urgently need them. Spot cash paid. Cosmopolitan Stamp Co., 1457 Broadway (Times Square), New York.

WANT Uncancelled United States Stamps. What Have You? Ben's Stamp Co., 72 W. Washington, Chicago 2, Ill.

## 98 PATENT ATTORNEYS

C. A. Snow & Co., S-427 Snow Bldg., Washington 1, D. C. Registered Patent Attorneys, Established 1875. Literature mailed on request.

INVENTORS: Before disclosing your invention to anyone send for Form "Evidence of Conception"; "Schedule of Government and Attorney's Fees" and instructions. Sent free. Lancaster, Allwine & Rommel, Registered Patent Attorney, 413 Bowen Building, Washington 5, D. C.

"INVENTOR'S Guide" free, containing 100 mechanical movements, information about patenting, selling inventions. Frank B. Ledermann, 154 Nassau St., New York 7.

PATENTS Obtained; selling service, information, recording forms free. Labiner, World Building, New York 7.

INVENTORS: Write for information on Patents and "Record of Invention" form, free. Randolph & Beavers, Registered Patent Attorneys, 340-A Columbian Bldg., Washington 1, D.C.



Copyrighted material

INVENTORS: Learn now—without obligation—how to protect and sell your invention. Write for free "Record of Invention" form and complete instructions for making disclosure and establishing date of your invention. We also send our new free "Patent Guide for the Inventor," containing complete information about patent procedure and how to sell inventions; giving illustrations of many successful inventions; over 150 basic mechanical movements. We assure you prompt, confidential service. Delays may be dangerous. Write today for your free "Patent Guide" and "Record of Invention" form. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 62B-E Adams Building, Washington, D. C

INVENTORS—Take prompt steps to protect your invention. Delays are dangerous. Get new Free Books, "Protect, Finance and Sell Your Invention," and "Invention Record" form. Preliminary information free. Reasonable fees. Conscientious counsel. Easy payment plan. Learn how to protect and sell your invention. Write us today. McMorrow, Berman & Davidson, Patent Attorneys, 143-B Atlantic Bldg., Washington 4, D. C.

PATENTS Secured. Two valuable booklets, "Patent Protection" and "When and How to Sell an Invention," together with valuable "Evidence of Invention" form sent free. Write immediately to experienced patent counselors. Victor J. Evans & Co., 141-E Merlin Bldg., Washington, D. C.

PATENTS—Trade marks. Irving L. McCathran, 316 McLachlen Bldg., Washington 1, D. C. Registered Patent Attorney.

## 99 PATENTS

INVENTORS: Test the commercial value of your patented or unpatented inventions, quickly and inexpensively. Write for free information. Institute of American Inventors, Dept. 30-B, 1926 Eye St., N. W., Washington 6, D.C.

PATENT Office searching exclusively. Prompt, confidential service assured. Invention protection form free. Write Raymond L. Smith, Patent Searcher, 410-S Bond Bldg., Washington 5, D.C. (Former U.S. Patent Office Employee.)

CAPITALIZE inventions without patent expense. Patents guarantee No Protection. Send $1.00 for booklet, "The Patent Racket", and profit thereby! Ryan Valve Co., Box 142, Easthampton, Mass.

## 100 PATENTS FOR SALE

OUTRIGHT or royalty basis, wardrobe automobile seat for hanging clothes wrinkle-free while traveling. Mrs. A. Z. Looney, 722 Sunset Drive, Lexington 19, Ky.

## 101 PERSONAL

DRUNKENNESS Is a disease which responds to treatment. Medical skill plus human sympathy prove successful with liquor and drug cases. 60 years experience. Write for free booklet. P. S. Nelson, The Keeley Institute, Dwight, Ill.

LONELY People Everywhere are finding real happiness through introductions by mail. Particulars sent Free, sealed. I'll show you proof. Nancy Jordan, P.O. Box 466 PS, San Francisco, Calif.

MAKE new friends thru old reliable club. Free book with photos of members. Correspondence confidential. Exchange Company, 3827-PS Main, Kansas City, Mo.

REJUVENATION! Also Diabetes without needle. Home treatments. Healthotel, South Whitley, Indiana.

LONELY? Dependable register for social correspondence. Miss Chase, Box 172, Seattle 11, Washington.

LONESOME? Write and tell us kind of mate you want. Worlds greatest club. Blair Club, 4554-J Broadway, Chicago 40, Ill.

LEARN Ventriloquism. 3c stamp brings particulars. Smith, Dept. 400, 801 Bigelow, Peoria, Illinois.

LONELY Club. Sealed particulars. Free. McLaurin, 1013 Roosevelt, York, Pa.

ATHLETE'S foot remedy Guaranteed $1.00 bottle prepaid. Dr. William Renz, Rm. 3, Chavanne Bldg., Lake Charles, La.

PSORIASIS Sufferers: Has everything failed to bring even temporary relief from scales, lesions and itching? Then write today for Free important information. You needn't invest one cent! Pixacol Co., Dept. S., Box 3583, Cleveland, Ohio.

MEET New Friends through our Personal Introductions. Original personal service dedicated to promotion of interesting friendships. Established 1935; discriminating clientele, all religious faiths. Phone Grace Bowes or visit us at our office any weekday. American Service, 236-PS W. 70th St., New York City. Phone Endicott 2-4680.

FREEDOM from Loneliness. Does your life lack something? Lonesome for someone with like aspirations? Congenial opposite sex introductions by letter. Nationwide. Amazing positive results. Christines, Box 9609-4, Hollywood 27, Calif.

SEND 50c coin for list of approx. 150 names (opposite sex) all within few years your age (give your age) to J. S., P.O. Box 66, Day-View Station, Dayton 6, Ohio.

MEN & Women that are lonesome and desire companionship, write to Box 1-C, Lecompton, Kansas.

HAIR Falling? Dandruff? Write Trichologist, 139 Lewis Street, Phillipsburg, N. J.

WIDOW and Widowers Friendship Letter Society. Confidential details in plain sealed envelope 25c. Write: John Rankin, Springfield, Mo.

LONESOME Get acquainted with hundreds of members. Confidential free particulars. Lone Star Club, P.O. Box 923, St. Louis, Mo.

HAVE Penpals worldover, Illustrated Magazine with list 10c. World Card Club, King, N. Carolina.

YOUR Penmanship improved in 3 hours—New-Way. Write, Ozment, 15, St. Louis, Mo.

WEIRD! The Book of Forbidden Knowledge. Black Magic. Ancient secrets revealed. Only $1.00 postpaid. Free! Occult catalog. Write: Delmonte Enterprises, 1919 Ditmars Blvd., Scribe E., Long Island City 5, N.Y.

GET Acquainted Club—Through social correspondence thousands yearly meet their "ideal". Write for list of eligibles. Many in your State. Simpson, Box 1251, Denver, Colorado.

POEMS Wanted for Musical Setting. Send poem for immediate consideration. Five Star Music Masters, 646A Beacon Bldg., Boston.

ATTRACTIVE ladies want lifemates, some own their home, or farm, many have good positions, 120 names, addresses, descriptions, $1.00. In plain sealed envelope. Frank Shilling, 1017-M Dueber, Canton 6, Ohio.

HYPNOTISM. Complete 20 Method Course, 25c. Western Institute Hypnotism D-1619, Palatine, Ill.

LONELY? Have Penpals, Sweethearts Everywhere. Magazine with descriptions 10c. Geo. C. Simon, 6843 Jonathon, Dearborn, Michigan.

MARRIAGE! Magazine with photos, descriptions, names, addresses 25c. Marker, 469 Broadway, Bedford, Ohio.

BORROW Money By Mail. No Endorsers. Everything Confidential. Complete Information 25c. Victory Service, Box 2215-A, Detroit 31, Mich.

BE a candy maker. Please your friends with skill at parties in your home and elsewhere. Learn to make delicious home pulled party mints. Always good. Pure sugar candy. Our recipe over twenty years old, tried and true. Send one dollar for recipe and instructions. If pound of mints desired send ninety cents plus one pound sugar. Prepaid. Max and Mamie Lee, Box 1710, Greensboro, N. C.

FORGET Constipation. Safe, sane, new way often ends constipation permanently. No medicine, no mechanical devices. Write today for Free information. House of Inspiration, 598 Sexton Bldg., Minneapolis 15, Minn.

ROMANTIC Publication—150 Names, Addresses, descriptions lonely people wishing correspondence. 35c. Year $1.00. Cupid's Magazine, Box 171, McKenzie, Tennessee.

WIDOWS And Widowers Don't Despair Send for our Free sealed particulars. Capitol Club, 3439 S. Michigan, Chicago 16, Ill.

LONESOME. Free Particulars. Love, Romance. Arlington Club, Seven Randolph Place, Washington 1, D. C.

LONELY? Plain sealed details free. Largest Club in West. Endorsed by ministers. Club Elite, Box 71, Los Angeles 53.

MAKE Friends, Acquaintances; quickly made through correspondence. Interesting. Confidential. Free particulars. Social, Box 157A, New York 11.

NERVOUS, self-conscious, fears? Be Courageous, Self-Confident, Magnetic. Sensational psychology course. Only $1.00. Dr. Malcolm Smith, 1104 Union Ave., Montreal 3, Canada.

LONESOME! Descriptions and details free. Big lists. ACME, Box 192-S, Aloha, Oregon.

LONELY, Have romance, companionship thru correspondence. Particulars free. Pearl Smith, Box 2732, Kansas City 13, Mo.

LONELY?—send for confidential Reading List. Ferrantebooks, 309 Third, Palisades Park, N.J.

PIMPLES Disappear overnight. I tried everything till I found this formula. $1.00. Morean, Box 243, Lowell, Mass.

WHY be Lonely. Particulars Free. Pearl Smith, Box 2732, Kansas City 13, Mo.

YOUR Handwriting Reveals? Your hidden talents. Valuable information. Special Analysis, Only $1.00. B. Bransford, 220 W. 21st St., Indianapolis 2, Indiana.

LONELY For Love Companionship? Join reliable club. Details Stamp. Francis Tower, Box 444-P, Kansas City, Mo.

IF You Are Lonesome, find your affectionate sweetheart or wealthy wife thru America's Largest Centrally Located Club. Members everywhere. Send $2.00 for large sealed list of persons your age. Dayton Club, P.O. Box 31, Dayton 1, Ohio.

ARE You Lonesome? Join this large league of affectionate and wealthy people. Send $2.00 for a three-year membership and large list of members all near your own age (No postcards, please) S.K.M. c/o P.O. Box 1052, Radford, Va.

LONELY Hearts Club That's Different! Introductions by letter. Confidential. Dignified. Honest service. Particulars free. Lester Golliday, H-1515 Long, Columbus, Ohio.

LONESOME? For a Trailway of Happiness, consult Lovers' Guide. $1.00 per year. Carolyn Petty, DeValls Bluffs, Ark.

USE "Therm-O-Rub" for Sore Muscles, Aches and Sprains. Get cooling sothing relief. Ideal for tired aching feet also Athletes Foot. Bottle 85c postpaid. Delfa Co., 3960 Avondale, Chicago 41.

THERE'S Someone In The World For You! You can find them among the thousands of subscribers to the Orange-Blossom Club Journal. Join today! Please mention your age when you write for free details. Orange-Blossom Club Journal, Box 1272, Vallejo, Calif.

NERVOUS? Bashful? "Fears?" Free, encouraging information. John Englund, Ironwood, Michigan.

LONESOME? Get "Cupid's Mail". Many quick marriages. (Stamp). Excel, 2149 Jackson, Chicago 12, Ill.

MATRIMONIAL — Sweetheart magazine. Photos, descriptions, addresses, 35c. Year $1.00. Barwood, 2037E 42nd, Astoria, N. Y.

BE Lonely No More! Open Destiny's Door! 50c Brings Cupid's Destiny. World's Greatest Social Publication, including nationwide names, addresses; either sex. Captivating descriptions; sparkling pictures—widows, widowers, bachelors, beautiful girls desiring early marriage. (Year, bimonthly, $1.00.) Mention your age. Destiny League, Aberdeen 75, Wash.

BUY Vitamins direct. Save. Postcard. Matoska Products, White Bear Lake, Minn.

LET the Sweetheart of Your Dreams Become Real. Find romance, marriage, happiness, thru the American Social Correspondence Club. Free sealed details. Write our director, Richard Smith, Box 123-S, Decatur, Ill.



Copyrighted material

NEW YORK CITY personalized shopping service. Also remailing service—letters 25c, cards 15c. Multiservices, 39-C East 7th St., New York City 3, N.Y.

SLEEP-RITE Earplugs stop noise, improve sleeping, health. Sample. Raymond Dow, 2922—164th Street, Flushing 23, N. Y.

SEX life tells what every one should know. Free catalogue. Interstate Publishers, 1429-B So. 51st Ct., Cicero 50, Ill.

LONELY—Ladies and Gentlemen, Join our club and find your Ideal. Confidential, dignified and unexcelled service. Members every where. Sincere people write. Mr. Heathcock, Box 1555, Dallas, Texas.

WANTED: Names of people who are suffering the annoyance of loose, slipping dropping Dental Plates. I have good News for you. Write today for information. No obligation. Dr. C. N. Reese, Dentist, Box 268-SV, Winnetka, Illinois.

LONELY—? Descriptions, photos-Galore Men—Women 10c (Age—?) Painter—Box P.S.-966, Akron 9, Ohio.

MYSTIFY your friends. Mail forwarded from New York. Ask for details. Rochmann, 69 E. 55th St., Brooklyn 3, N. Y.

## 102 PHOTO FINISHING

MONEY Back Guarantee—All this for 25c; Roll developed, 8 bigger DeLuxe prints, also 8 regular prints, plus two beautiful enlargements and tasteful Leathertone frame. Lifetone Photo Co., Dept. 58, Des Moines, Iowa.

8 EXPOSURE rolls 25c, over 8 exposure 40c, for one Velox print each and Free enlargement coupon. Reprints 3c, minimum 25c. Fred A. Eastman, Bode, Iowa.

IT'S Here! Technifinish for all camera films. Any 8 exposure roll developed and 8 enlargements only 25c. 35mm films fine grain developed and 36 enlarged prints only 90c 18 exposures 55c. Credit given for non-printing negatives. Reloads for 35mm cartridges, 36 exposures 35c, 18 exposures 20c. Printon color prints, large size 3¼x4½ with exclusive white borders, only 65c, 5x7 $2.00, 8x10 $3.00. Black-and-white negatives and 10 3¼x4½ black-and-white prints from your Kodachromes, only $1.00, 3 for 50c. Black-and-white positives from all 35mm films, 36 exposures 50c, 18 exposures 35c. Write for sample print, mailing bag, and complete information. Technifinish, Dept. 112A, Rochester 3, N. Y.

SENSATIONAL introductory offer! Send snapshot or negative, this ad, and 3c. We'll send you a beautiful 7" x 5" enlargement! Or, Kodak roll developed with 16 guaranteed deckled-edge velox fadeproof prints or 8 double-size prints, 25c! Special! From your negatives, 16 regular-size or 8 double-size reprints, 25c! Candid Rolls—36 exp. 35mm developed, vaporated, enlarged to 3x4, $1.00! 18 exp. 50c. Reprints, 3x4, 3c each. We have new, perfect 35mm film. Low prices. Free Mailer, details on request. American Studios, Dept. 280, LaCrosse, Wis.

PHOTOGRAPHY for pleasure or profit. Learn at home. Practical basic training. Long established school. Write for booklet. American School of Photography, 1315 Michigan, Dept. 1721, Chicago 5.

CENTURY delivers work and service that can't be beat. 8 exp. roll 25c with two professional enlargements Free. Century Photo Service, LaCrosse, Wis.

BIGGEST $1.00 value in 35 MM finishing today. 36 exposure fine grain 3¼x4½ enlargements; deckled, embossed margin and date. Eighteen exposures 75c; 16 exposure splits 55c; 36 exposure reloads 50c. Special: return this ad with $2.00 and we will send five 36 exposure reloads. Free mailers. 8 exposure rolls in beautiful, deckled contact finish with embossed wide margin, 25c. Mailbag Film Service, Box 5440A, Chicago 80.

AT Last: We Have Films:-116 & 616—38c ea., 120 & 620—33c ea., 127—27c ea. Roll developed, all your snapshots hand-colored as beautiful as most actual colored photography 35c. Hand colored reprints 4c each, 12 for 45c. Midwest Photo, Janesville 27, Wis.

ANY size picture reproduced! on postage-size photostamps. 100 actual photos $1.50. Artcraft, 1600 Coney Island, Brooklyn 30, N. Y.

OIL coloring photographs can be a fascinating hobby or profitable sideline for those with artistic talent. Learn at home. Easy simplified method. Send for free booklet. National Photo Coloring School, 1315 Michigan, Dept. 1721, Chicago 5, Ill.

FAST Delivery. Satisfaction Guaranteed. Eight exposure rolls with two prints of each exposure, 30c; or eight Jumbo size prints, 35c, completely finished. Write for special reprint prices. Pioneer Photo Print Service, Box 123, Wichita, Kansas.

DOUBLE Weight Enlargements 8x10—45c ea; 3 for $1.00, 5x7—30c ea; 3 for .75, 4x5—20c ea; 3 for .50, (3 prints from same negative). Send negatives with cash or M.O. No stamps. No c.o.d. All work guaranteed Quick service. Bob's Photo Service, 539 Badgerow Bldg, Sioux City 9, Iowa.

35MM Special! 36 exposure roll fine grain developed, hardened, enlarged to 3¼x4½ glossy, 90c. 18 exposures 55c. Reloads, 36 exposures 35c, 18 exposures 20c. 8 exposure roll developed, 8 sparkling doublesize enlargements 25c. MacDonald's Photos, Box 28-B, Congress Park, Ill.

BEAUTIFUL double size Pictures 3½c each, from 116 and 120 negatives. 3¼x4½ from all other sizes. All work guaranteed. Overnight service. Roll developed and 8 pictures 30c. Roll 12 pictures 45c. Roll 16 pictures 60c. Enlargements on double weight portrait paper 5x7—30c, 8x10—50c. Copies made from any picture 75c. Pacific Photo Service, Box 666, San Francisco, California.

8 VELOX enlargements 25c. Send roll or negatives for trial offer. Young Photo Service, 406-E, Albany 2, N. Y.

FREE "Lifetime" enlargements with roll developed plus 8 high-gloss prints—25c. Fast Service, work guaranteed. May Studios, Dept. 054, La Crosse, Wis.

50 RE-PRINTS $1., No limit. Studio, 1408-S Bond, Rockford, Illinois.

YOUR 6-8 Exposure Roll Developed and Two prints each good negative 30c; Or enlarged to about Post Card size 8 Exposures 25c. 12 Exposures 40c. 16 Exposures 50c. Rapid Foto Service, G.P.O. Box 413, New York 1, N. Y.

EXCLUSIVE Introductory Offer! 4 beautiful enlargements for 10c. Send any 4 negatives of the same size (up to 2½" x 4½") and we will return to you immediately 4 valuable enlargements—deckled and dated on Velox. Negatives returned with order. Send negatives, this ad and 10c coin today. This ad must accompany order. Mail-N-Save, Box 310-9 Quincy, Mass.

FILM 6 or 8 Exposure Roll Developed & Printed Plus 5 x 7 Enlargement Free. Complete 25c. Mail Film to Joy-Photos, G.P.O. Box 606, New York 1, N. Y.

TECHNIFINISH. Any 8 exposure roll developed and all pictures enlarged to 3¼ inches wide—only 25c. Write for new folder, sample print and mailing bag. All free. Technifinish, Dept. 88, Rochester 3, N. Y.

TECHNIFINISH 35mm films Fine Grain developed and 36 glossy prints enlarged to 3¼ x 4½ only 90c. 18 exposures 55c. Reloads for 35mm cartridges, 36 exposures 35c, 18 exposures 20c. Black-and-white positives from your 35mm films, 36 exposures 75c, 18 exposures 50c. Write for new folder, sample print and mailing bag. All free. Technifinish, Dept. 87, Rochester 3, N. Y.

TECHNIFINISH Printon color prints. Big 3¼ x 4½ enlargements with exclusive white borders only 65c, 5 x 7 $2.00, 8 x 10 $3.00. Additional charge for mounting. Black-and-white enlargements from your miniature color transparencies when mounted in 2 x 2 cardboard mounts, 10 negatives and 10—3¼ x 4½ prints only $1.00, 3 for 50c. Write for new folder. Technifinish, Dept. 86, Rochester 3, N. Y.

11"x14" FROM Negative $1.00. Barbell Photo, Box 395, Newark, New Jersey.

2 BEAUTIFUL Hi-Gloss prints each good negative and enlarging coupon with each 6 or 8 exposure roll developed 28c. Owlphoto Co., Weatherford, Oklahoma.

DELUXE Enlargements! Expertly reproduced from your negative. 5x7, 25c each; 8x10, 45c each. Satisfaction guaranteed. Mysto Labs., 31-B Bedford St., Boston, Mass.

CONFIDENTIAL developing with two prints each negative 25c. Royal Photos, 1718 N. Sixth, Harrisburg, Pa.

ROLL, developed, printed 20c. Reprints 50—$1.00. Howard's 3760 Fremont, Chicago 13.

GENUINE Moen-Tone finishing approved by thousands since 1898. 8 Exposure roll developed with 16 prints or eight enlargements . . . 25c. Moen Photo Service, La Crosse, Wis.

TRIAL 1 roll developed, printed 10c. Dick's Photo, Louisville, Ky.

## 104 PHOTOPRINTS, PHOTOCOPIES

DISCHARGE Papers, Birth Certificates, Marriage Licenses Photocopied. Exact Reproductions. $1.35 each. Returned Registered Mail. 24-hour Service. Duplicating Service, 714 19 St., Merced, Calif.

## 106 PLASTICS

MOLD model aeroplanes, Propellers, golf tees, fishing lures, toys, costume jewelry and novelties on a hand operated two ounce capacity injection molding machine you can build yourself. Need only nine inch lathe and bench drill press to make. Plans $2.00. Post Office Box 503, Toledo 1, Ohio.

PLASTICS—10c brings our Complete Plastics Catalog containing many Profitable, Fascinating Ideas! Special Kits and Bulk Assortments. Full line of Plastics. Also details about our Free Offer! Fast, Reliable Service! Write Today to Bellco Plastics, Inc., Dept. S1, 147 W. Sydney Ave., Mt. Vernon, New York.

PLEXIGLAS, Lucite 12"x12" sheets, 1/16" $1.60 ⅛" $2.00, 3/16" $2.25 ¼" $2.75 Rods 23" length by diameters, ⅜" .40 ½" .60 ¾" $1.25. Cements 2 Ounces .50 Dyes, Aqua, Red, Amber and other colors 2 ounces .50 each. Novelty Rods each, Heart .75 Cross .75 Donkey .60 Anchor .60 Ring .35 Plexiglas Assortment 1 lb., includes cement, drawings and instructions $1.25 Add 10% for postage. Complete Catalog 10c. Douglas Home Craftsman, Box 34M, Stamford, Conn.

LEARN at home "Working with Plastics." Full information on sheets, blocks, rods, tubes. Trade names, sizes, colors for fabrications. Designing, tooling, bending, cementing, polishing. Also for homework-shop. Only $1.25 postpaid. Money back guarantee. Modern Technical Book Co., Dept. M4S, 55 W. 42nd St., New York 18.

PLASTIC, Plexiglas sheets new; 144 square inches following thicknesses; 1/16" $1.60; ⅛" $1.85; 3/16" $2.00; ¼" $2.50; ⅜" $3.50; ½" $4.50; ¾" $7.25; 1" $9.25. 5% discount over 5 square feet, 10% discount over 10 square feet. Send prepaid. Send money order. Plastic Supply Co., 2618 St. Louis Ave., St. Louis 6, Mo.

PLASTICS. Make your own at home. Formula and moulding instructions $1.00. Box 84, Station K, Toronto, Canada.

PLASTIC, Cement, Dye, Sanding, Buffing, Instructions. Complete Kit. Two Dollars. No Checks. Rickys, 601 S. Vermont, Los Angeles 5, Calif.

MONEY in plastics! Lucite plastic hobby kit. Two pounds lucite material, coloring dye, cement. Instructions. Send $2.50 to Plastic Specialty Co. (Dept. S) 192 Lexington Ave. New York 16.

SMALL dime brings you valuable newly published manual on Plastics Fabrication. Edited by experienced plastics technicians. Easy to follow proceedures. Latest techniques. All Plastic materials. Comprehensive. Special offer includes Free copy of brand new Plastics Catalogue. Covers all types of rigid, semi-rigid flexible and laminating materials. Gives sizes, specifications, prices. Lists polishing and buffing compounds, cements, dyes, hardware, tools, accessories. All for your one dime. Mail it today. Satisfaction guaranteed. Berton Plastics Inc., 19 W. 21st St., N.Y. 10, N.Y.

PLEXIGLAS kit, 13 pieces ¼ inch thick! No Scrap! All brand new, all masked! Simple, easy directions, everything included $3.75. Same kit ⅛", $3.40. Masked sheets 6" x 12", ¼" $1.50; ⅛" $1.00. Postpaid in U.S. Send money order. Jacks Plasti-Kraft, Dept. PS5, 4715 Bromley Ave., Bradbury Park 20, Md.



Copyrighted material

## 108 POULTRY AND SUPPLIES

RAISE turkeys the new way, write for free information explaining how to make up to $3000.00 in your own backyard, address National Turkey Institute, Dept. 57, Columbus, Kansas.

## 109 PRINTING, MULTIGRAPHING, ETC.

400 5½x8½ LETTERHEADS $1.25. Mango, 555-B South 20th, Newark 3, N. J.

QUALITY Printing At Lowest Cost. Free samples, pricelist. Adams-SP, 30 W. Washington, Chicago 2.

GOOD printing! Low prices! Large, small, quantities. 250 Letterheads, 250 Envelopes, $2.75. Samples free. Joseph Johnson, 1382-B Fifth Avenue, New York City 29.

500 BOND Letterheads 8½ x 11 $1.95 postpaid. Customprint, 211, Springfield 5, Mo.

QUALITY Printing prepaid: Business, personal stationery. Letterheads, envelopes, statements. Prices reasonable. Samples. Mero Products, 99 Morrison, Punxsutawney, Penna.

FINE Printing—Reasonably Priced, Prompt Service. Samples. Treaster Printing, (S5-46), Milroy, Penna.

350 BUSINESS cards $1.00 postpaid. Artcraft, 40-06 97th, Corona 2, N.Y.

RYTEX Box—Social Stationary, 100 sheets, 50 pink or blue lined envelopes. $1.69 Postpaid. Lucas, 53 Horatio St., N. Y. 14.

GUMMED Labels and Stationery. List Free. Box PS-135, Spiro, Okla.

BUSINESS, Personal Stationery. State requirements. Samples, Price List free. How Printing Co., 717-23 Eunice, Webster Groves 19, Missouri.

SEND 10c Now, for our 36-page 1946 pricelist—refunded first order. McCall Press, 1326 S. 27th, Omaha 5, Nebr.

PLEXIGLAS, Lucite scrap from our factory, mostly masked. Sizes, thicknesses assorted. 6 pounds $3.00, 12 pounds $5.00 prepaid. Plastic Fabricators, 44 Murray St.,

FIRST class printing, reasonable. Free samples. Walker, Box 1298, Amarillo, Tex.

LETTERHEADS, Envelopes, Circulars, folders, Booklets, Labels, imitation letters. Quality workmanship, low prices. Get our estimate on your needs. Lonelm Printers, Paulding, Ohio.

## 110 PRINTING OUTFITS, SUPPLIES

PRINT your own Postal Cards, paper, or anything on "Printomatic Self-feeding Rotary Postal Card Stencil Duplicator. Only $9.50 with $2.35 worth of supplies, Stencils, Ink, etc. Literature Free. Pittsburgh Typewriter Supply, 336-RE Fourth Ave., Pittsburgh 22, Pa.

PRINTING equipment, type and supplies. Send stamp for details or dime for complete illustrated supply book. Kelsey Inc. X-8, Meriden, Conn

PRINTING Presses, Type, Supplies. Lists 3c. Turnbaugh Service, Loysville, Pa.

INEXPENSIVE home-made printing press. Details free. Novelty Shop, Downsville, Louisiana.

PRINT At Home—Send 10c for Catalogue —Type, Presses, Supplies. Barnhard Co., 6 Columbia St., Newark 5, N. J.

CUTS—Make real halftones, linecuts yourself! Samples 25c. Particulars free. Rapid Chemical Service, Edwardsville, Illinois.

## 111 PROFITABLE OCCUPATIONS

ANNOUNCING home study course in commercial baking. Practical basic training. Good field for those with aptitude. Nearly depression proof. Send for free booklet. "Opportunities in the Baking Industry." National Baking School, 1315 Michigan Ave., Dept. 1721, Chicago 5, Ill.

$5000 FROM Half Acre! Growing Ginseng. Seed, contract supplied. Particulars 10c. Associated Growers, Dept. 12, St. Norbert, Manitoba.

$40.00 WEEKLY. Made growing mushrooms. Fresh, Dried. Dominion Patent 331583, free spawn. North American, 169Y Yonge, Toronto, Canada.

LOCKSMITHING—Profitable Business or Hobby! New course teaches you how to pick locks, fit keys, de-code, masterkey, etc. Easy self-instruction lessons. Bargain price. Fascinating 100-page illustrated catalog Free! Write Nelson Co., Dept. 2-01, Chicago 5.

MUSHROOMS Grown; Boxes, Barrels. Instructions 50c. Spawn $1.00. Gordons, 553 William, Winnipeg, Manitoba.

START profitable mail order business on small capital. Write for free details. A. E. Young, 1524 S. Rawleigh Ave., Freeport, Ill.

EXCELLENT profits raising Mink. Choice breeding stock available. Details furnished. Franklin Young, Riverhead, New York.

PAINTING flagpoles often pays $50.00 daily. Particulars free. The Skyline Co., P.O. Box 1601-A, Uniontown, Pa.

YOUR Own profitable mail order business. Get set for life. Use spare time to grow independent. We show you how. For full particulars, write. Van Enterprise, 3308 S. Quincy Ave., Milwaukee 7, Wis.

PANNING Gold—Free Literature Pictures. Old Prospector, Box 21R23, Dutch Flat, Calif.

"12,000 ALASKAN Job And Business Opportunities" $1. brings 1946 copyrighted booklet explaining How—When—Where to apply with tips on Excellent Business Opportunities and Government Homestead Lands at 25c per acre to approved applicants. Transcontinental Research, Box 2147-XP, Hollywood 28, Calif.

GOLD—Stamping is fascinating and profitable. Free booklet. Home City Specialties, Dept. PS 1237, Springfield, Massachusetts.

MAKE Beautiful Costume Jewelry At Home For Large Profits, Hobby or Therapy. Free Illustrated Wholesale Catalogue of Sea Shell, Metal and Plastic Parts Contains Detailed Instructions. Florida Supply House, Bradenton, Fla.

## 112 RADIOS, SUPPLIES & EQUIPMENT

RADIO Service men and experimenters send stamp for our giant radio catalogue. Save dollars. United Radio Co., (1000-V), Newark 1, N. J.

MAKE Simple, Tubeless, Batteryless, Distance-Getting Crystal Radios. Crystal and illustrated instructions 25c postpaid. Allen, 427-S, Clinton, Mo.

TEN Simple, easy to build Crystal Radio Diagrams and Crystal 25c Postpaid. Potter, 1314 McGee, Kansas City 6, Mo.

TELEVISION: Send 50 cents coin/stamps for complete list including diagrams for television sets RCA, GE, Dumont, Andrea. Free with order $5.00 or more. RCA 5BP4 Cathode Ray tube, factory sealed, $18.00. Many others. Electronics Service & Supply, 264 W. Fortieth, New York.

BUILD your own Radio. All kits complete, including speaker, 4 tubes & full instructions, 10.95. Details & latest parts catalog. National Radio Distributors, 1029-P E. 163rd St., N.Y. 59, N.Y.

FAMOUS Razor Blade Radio! Illustrated Plans 35c. New Radio, Lohrville, Iowa.

LOWEST Prices. Radio Tubes, parts. Bargain Lists 3c. Potter, 1314 McGee, Kansas City 6, Mo.

REVISED Plans 18 Crystal Sets (SW record 5300 miles), including "Radiobuilder" 25c. Laboratories, Box I-t, San Carlos, California.

BUILD Newest, Extra-Loud Crystal Set. Instructions, 20c. "All About Crystal Sets", Booklet, 45c. Amorose, Rt. 4, Hungary Rd., Richmond, Va.

RADIO Tubes—Attention Radio Repair Service Men. For satisfaction in Radio Tubes, Le-Hi Electrical Co., 660 Broadway, Newark 4, New Jersey. Distributors of guaranteed Radio Tubes.

LOUD Speaking Crystal Radio, improved design. Illustrated plans 30c. Radio Clinic, 10631 A Euclid, Cleveland 6, Ohio.

CRYSTAL Radio operates loudspeaker. Illustrated instructions 25c. Sensitive crystals 25c. "Old Reliable" Crystal set kit $2.95. Single radio phone $1.50. Aerials 75 feet with 2 insulators 85c. Enamelled wire 25c per coil. Crystal and Tube diagram 25c. "Worlds Simplest" 1-tube diagrams 25c. Catalog free, Hulet, 334B E. 39th N. Y.

POCKET Radio! Build vest pocket radio for local and long distance reception. Listen while walking or working. Attractive. Unique. Plans and photo $1.00. United Manuf. Associates, R2 B239-A2, Ft. Worth, Texas.

TINY-Talky, one-tube transceiver; Paired-transceivers, new unit for communications; three-tube superheterodyne receiver, equivalent to five-tube receiver; Two-tube super-regenerative receiver, equivalent to four-tube receiver. Complete schematics, layouts, instructions for any one of the above, one dollar. Richard J. Preston, Brentwood, Excelsior, Minnesota.

PLANS and Parts for Crystal Radios. R.R. No. 10, Box 802-B, Ferguson 21, Mo.

LOUD Speaker plays on Crystal Detector. Technical manual tells how. Build your own. Send $1.00; on arrival pay postman 99c plus delivery. R. G. Middleton, 47-25 44th St., Woodside, L.I., N.Y.

RADIO book:—"Everybody's Radio Manual". Tells how to service all radios at home. 256 pages, 216 pictures. Deluxe edition, $1.49. Popular Science, Dept. 56-C, 353 4th Avenue, New York 10, N. Y.

RADIO Tubes Wholesale Retail Test Equipment. World Sales, Box 81, Clifton, N. J.

RADIO service flat rate schedules solve pricing problems. Compiled from 20 years experience. Write for information. Radio Equipment Co., 1415 W. Franklin Ave., Minneapolis 5, Minn.

FAMOUS "Allen" Midget Semi-Fixed Crystal Detector, Set Building Plans and 100 late crystal set Distance Reports all for 50c. Postpaid. Allen, 427-S, Clinton, Mo.

RADAR Crystals now available for your crystal set. Free details. Hayes, 4004-B Arcade Bldg., Seattle, Wash.

WALKY-talky one tube transceiver. Complete schematics, layouts, instructions, one dollar. G. M. Amdahl, 1620 E. Beach, Gulfport, Miss.

1 TUBE Radio Kit, including tube, phone, two batteries—nothing else to buy. Easy to build, place parts on picture diagram and connect. Anybody can do it. Gets local, distant stations $10.95 prepaid. Free parts list D. John Barron, 662 85th St., Brooklyn 9, N.Y.

WESTERN Electric fixed crystal detector, no adjusting, gives loud steady signal nothing like it, a war development. Excellent for crystal sets, meters, other uses, cost Government $6.00 prepaid 99c. Free list A. Radio City Labs, 30 Church St., New York 7, N.Y.

CIGARETTE case radio. Superregenerative ultraaudion circuit. Plans and instructions, one dollar. R. L. Brown, Box 15, Bethany, Okla.

HAVE fun, building super crystal radios, educational, illustrated instructions and crystal 25c postpaid. Boyer, 634 Nebraska, Kansas City 2, Kansas.

## 114 REFRIGERATION

"REFRIGERATION Service Manual." Domestic, Commercial, Construction, operation installation, testing, trouble shooting, replacement, repair etc. 300 pages; fully illustrated, $2.25 postpaid. Money back guarantee. Modern Technical Book Co., Dept. MS, 55 W. 42nd St., New York 18.

## 116 REPTILE PRODUCTS

HOBBY Catalogue 10c. Eight Reptile Bulletins 25c. Chameleon 25c. Ten small snakes $1.25. Salamander 25c. Box turtle 50c. Quivira Specialties, Topeka, Kansas.

## 118 RUBBER STAMPS

RUBBER Stamps, 3 lines 35c; Signatures $1.75; Pad 25c. Printrite, Wauwatosa, Wis.

THREE line, Self-Inking Pocket Stamp $1.60. Ideal Rubber Stamp Co., Detroit 8, Mich.

RUBBER stamps, all kinds. Send for Catalog, Excello Sales, Box 500, Shreveport, Louisiana.

BETTER Rubber Stamps. Ezy-Order Literature Free. Lee-Vall Press, Box 1242, Indianapolis 6, Indiana.

## 119 SCIENTIFIC EQUIPMENT

METAPHYSICIAN treatments. Simple scientific apparatus book $3.55. New Artisan Psychiatrist. Lytles, 281 Main, Watertown, N. Y.

AMATEUR Astronomers! Year's subscription "Sky and Telescope", discount on mirror kits, books, equipment, year's membership in our organization, including our publication, all $5.00. Astronomical Research Foundation, Box 645, Kokomo, Indiana.

## 122 SONG WRITERS

SONGWRITERS: Collaborate with nationally famous composer of "Boots and Saddles". Send poems for free examination. Get Free instructive booklet. Hollywood Harmony House, 126 S. La Brea, Studio L-15, Los Angeles, Calif.

POEMS Wanted to be set to music. Free examination. Send poems. McNeil, Master of Music, 510-PS S. Alexandria, Los Angeles, California.

SONGWRITERS. Songs Published Monthly. Advance Royalty. Send your songs or poems today for our exciting offer. Hollywood Tunesmiths, Dept. 10F-C, 1537 N. Vine, Hollywood 28, Calif.

WANTED! Lyrics, melodies for songs. We arrange, publish, sell. Superior Song Studios, Passaic, N. J.

SONGWRITERS! A limited amount of songs wanted for radio distribution. Tin Pan Alley, Inc., 1650 Broadway, New York 19, N. Y.

POEMS Wanted for musical setting. Composers' Guild of America, 545 Fifth Ave., New York 17, N. Y.

POEMS Wanted for musical setting. Send poem for immediate consideration and Free Rhyming Dictionary. Richard Bros., 46 Woods Bldg, Chicago.

SONG Writers—We want your poems! Your poem set to music by a hit parade composer and his staff—recorded by a well known professional radio singer, sung over radio. Lead sheet furnished. Send your poems today for free examination and our exciting offer. Screenland Recorders, Hollywood 28, Calif.

SONGWRITERS—Send Poems for immediate examination and Free Book, "Your Future in Songwriting". Radio City Music Academy, 1674 Broadway, New York 19.

SONGWRITERS: $100 Cash Awarded Each Month For Best Song or Song Poem. Melodies supplied Without Charge By Hollywood composers. Lead sheets and records furnished. Cinema Song Co., Dept. B-34, Beverly Hills, Calif.

SONGWRITERS! Outstanding, amazing offer. Hibbeler, C15, 2157 N. Avers, Chicago.

NEW songs and lyrics wanted for Popular Radio Program and professional promotion. Free examination. Transradio Music Inc., Dept. P.S., 1650 Broadway, New York.

POEMS Wanted for Musical Setting. Send poem for immediate consideration. Five Star Music Masters, 646 Beacon Building, Boston.

SONG Writers Attention! The amazing demand for phonograph records, accelerated by more than 300,000 Juke Boxes and the Hits accredited them warrants your immediate consideration. We are offering song-poem writers the rare opportunity of having established composers collaborate on appealing material received this month. Recola Records, Box 987S, Hollywood 28, Calif.

MAGAZINE for Songwriters! 10c. Songs published free. "Songwriter's Review", 111-S W. 48, New York City.

QUESTIONS answered on songwriting. Dollar each. Robert Saunders, Scotland, Md.

SONGWRITERS, Have your songs or lyrics completed by an honest, experienced arranger. Free analysis report. Tommy Kilbourne, Box 1253, Bakersfield, Calif.

EXTRA Copies of your music, Inexpensive-Musicopy Service, Box 181, Cincinnati 1, Ohio.

PROFESSIONAL Musician's special: Composers', Arrangers' melody-harmonization chord chart, plus simple staffless shorthand for quick sketches, $1.00 complete. Paul Stackpole, 2110-12 W. Venango, Philadelphia 40, Pa.

THE 96 page "The Complete Songwriter" tells how to write music, words, arrangements and publishing. Send $2.00 M. O. Puritan Publishing Co., Inc., 343 S. Dearborn St., Chicago 4, Ill.

SONGWRITERS Publishing Agreement Free. Stuckmann Music Press, 5426 Broadway, Chicago 40.

SONG poems wanted—All subjects. Send your best poems today for free examination, or write for free booklet "Getting Ahead in Songwriting". Song Service, 331-J West 46th, New York.

SONGWRITERS: 6 Mailing Lists. Publishers, 25c. S. Battiston, 31-69 41st St., Long Island City, N.Y.

COPYRIGHTS. Robert Daley, 19 S. LaSalle St., Chicago 3, Ill.

MELODIES, Lyrics, $3.00. Arrangements. Sholl, 2217 Penn St., Harrisburg, Pa.

## 123 SOUVENIRS

GENUINE German Medals, secured from homecoming G. I.'s. Limited number available. Other Foreign Souvenirs. Price list 10c. Hobbyguild, S 35 W. 32nd, New York.

ATOM Bombed Nagasaki Fifteen Actual Photographs $1.00 Postpaid. Makins Pictures, 538½ Washington, Bremerton, Wn.

DECORATED Facsimiles Japanese Surrender Document Original Signatures. World Figures, Complete 50c. Alsy Sales. 524 Broadway, N.Y.C.

SET of Ten assorted World War II Ship Pictures—$1.95 prepaid. Liberty Picture Co., Box 3797, Portland 8, Oregon.

## 124 SPORTING GOODS, GUNS, FISHING TACKLE, ARCHERY

BOWS-Arrows for Recreation-Hunting-Fishing. Beautiful Archery instruction book, 70 pages, 50 illustrations, only 50c. Illustrated catalogue Free. Archery Sales-Service, 617 South State, Chicago.

USED Guns, Binoculars, Bought Last opportunity to get good prices before new merchandise comes in. Also Sold and Traded. Stoeger Arms Corp., 507 5th Ave., New York 17, N. Y.

"AMMUNITION"—New and Used "Shotguns"—"Rifles"—"Handarms". List 10c. Rudolph's, Atchison, Kansas.

SEND 10c for list 100 used guns. Frayseths. Wilmar, Minnesota.

2000 BARGAINS, firearms, binoculars, war relics, catalog 30c. Smith Museum, Runnemede, N. J.

USED Guns, bought, sold, exchanged. List stamp. Howe, Coopers Mills, Maine.

CORK Grip, replacement. Fits any casting rod handle. 40c, 3 for $1.00 postpaid. Lane Cork, 18655 Washburn, Detroit 21, Mich.

440 ANTIQUE Firearms:—5,000 Bargains: —Coins, Indian Relics, Cartridges, Minerals, Rifles, Swords, Fossils, Flintlocks, Carbines,—Catalog with photographs 25c. Heike, Wenona, Ill.

MAKE Fish Traps. Blueprint, 30c. We-Sho-Yu, Box 51, Detroit, Mich.

FISHERMEN! Latest Tackle sensation! "Para-Lure" Nationally advertised. Lure-Teaser-Drag for trolling, casting, chumming. Parachute principle maintains drag on leader. Prevents hook throwing. Permits using lighter tackle. $1.50 postpaid. Satisfaction guaranteed. Details free. Para-Lure Co, Box 7051, Newark 7, N.J.

ARCHERY, Factory Prices. Free catalog. Sheboygan Archery Co., Sheboygan 2, Wis.

CRASHPROOF, 22 inch 3 bladed "flying propeller" flies 250 feet. Always returns to you. No wings. No motor. Ready to fly $1.00. Carl Jamer, Box 494, Manorville, N.Y.

## 127 STAMP COLLECTING

ZOWIE-E-E! A Barrel of Fun for only a Dime! 500 United States Stamps—Absolutely unpicked and unsorted, just as received from church missions. Many varieties, including large commemoratives, airmails, high denominations up to $5.00! Stampdom's biggest package of fun, and you might find something really valuable! ! Price only 10c to serious approval service applicants. Money back if not delighted. Illustrated bargain lists with each order. Mystic Stamp Co., Dept. 55, Camden, New York.

WORLD'S Largest Diamond And Triangle Stamps. Free Stamp Magazine. Stamps from Fighting Free French. 20 stamps from 20 different Countries. Pictorials. Airmails. Big Bargain 5c with approvals. Capital Stamps, Dept. 10, Little Rock, Ark.

BRITISH Empire! 55 Different including Batum, Burma, Cyprus, Gwalior, Tasmania. 5c to Approval Buyers. Lyman, 97 Nassau St., New York 7.

FREE—Canadian Sets. Royal Visit, George VI, George V, Coronation, Jubilee, others, to approval applicants. Ensign, Box 118-P, So. Orange, N. J.

118 DIFFERENT stamps including commemoratives, charities, airmail, sets, etc. Only 3c to approval buyers. We buy collections. Badger Stamp Co., Milwaukee 3, Wisconsin.

SCARCE 1880 U. S.—Hussey Local Carrier Stamp listed at 15c. Also Costarica No. 65 listed at 40c. Both sent free to approval buyers sending 3c postage. Pladon Stamps, 1717-S Idaho, Toledo 5, Ohio.

COMPLETE "United States" catalog with 1000 illustrations! Send 10c for mailing. Harris & Co., 99 Transit Bldg., Boston, Mass.

DEALER'S Wholesale Catalog. Postage 3c. Franksco, 5031 Queensberry, Baltimore, Maryland.

SCARCE "Pole To Pole" Packet! Stamps from strange, mysterious countries only —Greenland (North Pole!) Solomons, Spanish Morocco, Bhopal, Patiala, Siberia, Grahamland (South Pole!), Djibouti, Zanzibar, etc., and including stamps cataloging up to 25c each! Our Price only 5c to approval applicants. Big Dime Packet List free! Methuen Stamp Service, Inc., Dept. 146, Lawrence, Mass.

BOX Stamps containing hundreds all different cataloging up to 25c each. Everything $1.00. Longacre Shop, 100-C W. 42nd, N. Y.

WOW! $10.00 Worth Of Fun Only 10c. What a treasure hunt! Big package 500 Foreign Stamps—just as received from foreign missions other sources. Includes stamps from Africa, South America, Philippines, Free French, Cape Juby, Palestine, etc. including airmails, commemoratives, and stamps worth up to 50c and 75c. This amazing offer is given for 10c to serious approval applicants only. One to a customer, money back if not more than delighted. Jamestown Stamp Co., Dept. 5, Jamestown, New York. Stamps—Valued Up to 50c And 75c Each.

50 DIFFERENT including scarce diamond-shaped airmail 3c to approval service applicants. Avalon Stamp Co., Dept. S, Springfield 8, Mass.

FREE! Leeward Is., Cayman Is., Turks and Caicos plus 54 different mint World's Fair poster stamps, to approval service applicants sending 3c postage. Tatham Stamp Co., Springfield 50, Mass.

FREE—Pick 25c worth of stamps from our first U.S. Approval Selection . . . Approximately 100 stamps to choose from . . . Excellent value . . . No obligation to buy. Lists illustrating the most popular U.S. stamps—at prices you can afford—will be included. Don't miss this opportunity! Write today. S. D. Engel Co., 38 Park Row, New York City.

19th CENTURY U. S. Commem. Civil War-Battleship revenues, $5 and $10. Stamps free to U.S. approval applicants. Metropolitan Stamps, 198 G, Broadway, New York.

25 DIFFERENT India-3c with approvals. Premiums with purchases. Brandwein Stamp Co., Box 92P, Bayonne, N. J.

UNITED STATES approvals complete coverage fine quality, attractive prices. Seminole Stamps, Box 378, Coconut Grove, Florida.

AIRMAILS of World—19 different including Bolivia Triangle, World's Fair, Commemoratives, new issues 5c with approvals. Continental Co., Dept. c, Box 639, New Rochelle, New York.

55 DIFFERENT United States—5c. Approvals. Utechts, 1143D, No. Keeler, Chicago 51.



Copyrighted material

GORGEOUS Colors, scarce Airmail, Surcharges, Charities, Sets etc., All in our Big Premium packet only 3c to approval Buyers. Dixie Stamp Co., Dept. PS, Milwaukee 3, Wis.

ALL Yours! Falklands, So. Orkneys, Grahamland, Gold Coast, Rhodesia, U. S. Commemoratives, etc. Everything 10c to approval applicants. Irvine, 3239 Biddle, Wyandotte, Mich.

FREE St. Helena pictorial and big surprise packet to approval applicants. Pioneer, Box 414B, Pasadena 18, Calif.

FREE—Famous American, Snake Stamp, others, 5c postage with approvals. Robert Ewing, Wapakoneta, Ohio.

ILLUSTRATED price list, American and foreign complete sets, many Italian specials, free. Kuley, 2 Crary Avenue, Mount Vernon, New York.

WANT to sell stamps? Let Your hobby pay for itself—and make money, too! Stamp brings full details. Ralph Cole, 701 Cleveland, Eveleth, Minn.

POSITIVELY Greatest Free Offer—Latest Scott's International $5.00 Stamp Album —Covering entire World, contains 36,000 illustrated, descriptive spaces; Scott's 1946 Standard $5.00 Catalogues "Philately's Encyclopedia"—absolutely Free to applicants for Foreign Approvals becoming customers. Plymouth, Bell, California.

GERMAN Hitler Stamps. Brought over by American soldiers in small quantities as souvenirs. These stamps are bound to be very scarce because all remainders have been burned by Allied Governments. The most unique items in any collection. We will send two values, mint, one regular size and one large size, both for only 10c to sincere approval applicants. Please state whether approvals should consist of United States or foreign or both. Approval Headquarters, Globus Stamp Co. 268 4th Ave., New York City, Dept. 217.

RICH Man's approvals, poor man's prices. Grand value packet containing five Foreign sets. Free with approvals. Stoll Stamp Service, 2632 W. Burnett, Louisville 10, Ky.

FREE! Complete Balkan aviation set with approvals. Beaman, Glenburnie 10, Maryland.

FREE! Tiny Chinese "Midget" War set Approvals, Seminole, Glenburnie 10, Maryland.

114 DIFFERENT stamps from far away countries including Airmail and Free Fighting French to approval applicants for 10c. Reich Stamp Co., 4647 Kenmore, Chicago 40, Dept. S9.

1000 MIXED U. S. Old And New 25c. Weatherby, Medina, Ohio.

WORLD wide collection. Excellent assortment. 1,000 stamps only $1.00! Stamp Shop, Box 308-E, Harriman, Texas.

28 DIFFERENT unused Russia, or 25 Switzerland, 3c Approvals. Rosen, 1619 Bathgate, N.Y.C.

FREE 200 mixed stamps, approvals. Barwis, 4748 Umbria, Phila. 27, Pa.

100 DIFFERENT U. S. postage 20c. Approval applicants. W. J. Lange, Marion, Iowa.

MINT Pictorials Free To Approval Applicants. Surf Stampco, Box 2296, Miami Beach 40, Fla.

FINE Approvals, freshly mounted. Fast, personal service. Tell me what countries you prefer and I'll send their stamps. Milton Skinner, 438 Locust, Long Beach 2, Calif.

FREE—Abyssinia, Cayman Islands, Tuna Triangle, Indochina, Syria, Ivoire, Philippines (Jap "Shame" issue), Turkish Harem, Damascus, Cambodia, African "Beauty", Pirate Islands, Colonials, others—All Free for 3c postage with approvals. Belmont Stampco, Washington 10, D. C.

UNITED States and Foreign stamps sent on approval outstanding quality, low prices. Fred Herzberg, PS 168 Oak St., Elmhurst, Ill.

FREE! Negro Triangle; Turks Islands "Cactus"; Dakar; Guinea; Palestine; "Fairy Tale", Pirate Chart, Map, Ship, Sea Lion and Snake stamps; French, British, Portuguese Colonies, etc., Free for 3c postage. Approvals. Potomac Stampco, Washington 10, D. C.

1,000 GRABBAGS, 15c each. Special Bags 25c. Sandy, 630 Bingaman, Reading, Pennsylvania.

VICTORY Packet Free: Includes stamps from Tanganyika—British Cayman Islands — Animal — Scarce Babyhead — Coronation — Early Victorian — Airmail —Map Stamps—with Big Catalogue—all free—send 5c for postage. Gray Stamp Company, Dept. PR, Toronto, Canada.

SATISFACTION assured. Mystery grabbag offer with approvals. No junk 3c postage. Hintz, R-1, West DePere, Wis.

TRY our better grade U.S.—Foreign Approvals—Premiums with each application for approvals. Box 12, LaSalle, Niagara Falls, N. Y.

COSTA RICA Diamonds, Triangle, Air-Mails sets, 10c Approvals. Regal Stamp Co., Box 94, Flatbush Station, Bklyn. 26, N. Y.

SWAP Your Duplicates Join Packet Exchange, Box 82, Rochester, Minn.

NEW Issue Commemoratives—10c—to United States approval applicants. Jarr, Box 217z, Madison Square Station, New York 10.

FLASH! Amazing Value! Djibouti, Bechuanaland, Cameroons, Dominica, others, 6c to approval applicants, Southwest Stamp Co., Box 117, Long Beach 1, Calif.

1000 MIXED United States 18c. Two Pounds $1.25. Mixture List Free. Halay, 452 W. 58th St., New York 19.

100 DIFFERENT Stamps with Approvals 5c. Thurman Bailey, Pierson, Fla.

PHILIPPINES—Jap. Occupation mint pictorial set (face value 25c) Special 12c to approval applicants. Philip Gagne, 195 Park, Lewiston, Maine.

UNITED STATES Approvals. Fine quality, wide variety. George Klein, Vincennes 1, Indiana.

EXTRAORDINARY Pictorial Collecting. Including Tahiti Spearfishing, Melanesian Idol, Carib Archer, Malagasian Farmer and many other strange stamps from unusual countries. Everything only 5c. Imperial Stamp Co., 20 S. Broadway, Yonkers, N. Y.

25 DIFFERENT Switzerland 10c with ¼-½-1c approvals. Carroll's, 4357C-S. Hoover, Los Angeles 37, Calif.

FIFTEEN Different Persia, 5c with Approvals. Knowles, Box 432-S, Baltimore 3, Md.

FREE! AirMail Packet to Approval Applicants. Deane Stamp Co., Box 1002, Miami Beach 39, Fla.

FOREIGN Stamps Packet—3c. Approvals. Smith, Box 71-B, Roselle, N.J.

1000 SURPRISE Packets, 10c each, include 3c to cover handling. Bob's Stamps, 1540 S. Oak Park Ave., Berwyn, Ill.

COSTA RICA diamond and triangle set to approval applicants for 3c postage. M. W. Payne, W Cheshire, Conn.

$1.00 WILSON—25 others, approvals, 6c. O. Burgett, Lima, Ohio.

5 HITLER Stamps only 3c, with Approvals. Gaydos, Kenosha, Wis.

GRAHAM Land, South Georgia, South Orkneys, South Shetlands, Falkland Island Dependencies. Stamp from each dependency with approvals 10c. Collins', 71 Coleridge, San Francisco 10, Calif.

THIRD Philatelic Exhibition Sheet 25 cents To Approval Applicants. Louis Merrill, 1623 5th, Portsmouth, Ohio.

ATTRACTIVE Packet Free to approval applicants. Rare Stamp Service, 1171 N.W. 66th St., Miami 38, Fla.

FREE "Hitler Head" Set. Request Approvals. Blatt, 1015 Pine, Philadelphia 7, Pa.

CANADA 246-48 5c 249-59 65c. John Winn, Bolivar, Mo.

THE Most Fascinating Invention in stamp collecting History. Send a silver dime for 50c worth of samples. K. Bileski, Station B, Winnipeg, Canada.

50 DIFFERENT, Free. With approvals, any country. Purchase's, 231-A E. 88th St., Los Angeles 3.

COLLECTORS—Write for Post-War Stamp Approvals and receive a Premium Coupon. Brownie Stamp Shop, Desk 5, Flint 5, Mich.

JOIN Our Cover Club $1.00 minimum receive them as issued and save. Free gift. Walter Hoenes, Dept. PSM, Cologne, N.J.

PENNY Approvals. Thousands different. Pictorials, commemoratives, Airmails. Raymax, 123-X William St., N.Y.C. 7.

FOREIGN Mixture (Wide Variety, Many countries). 500 for 25c. 2500 for $1.00. 100 different Austria 40c. 100 different Japan 75c. 100 different Persia $1.00. 100 different Spain $1.25. Catalogs Free. Mission Mart, Washington 17, D.C.

SPAIN—Five Airmails. 10c. Approvals. Buchanan, 307 E. 23rd, N.Y. 10.

FIFTH Army Commemoratives! Flashy Stamps in Three Colors; With the Shoulder Patches of our own 5th Army and the Brazilian Division—Sold Out On Day of Issue! 20c and 40c. These Colorful Stamps Given for only 5c to serious approval applicants. Star Stamp Co., Dept. 4, Lakewood, New York.

ATTRACTIVE Approvals for Beginners, advanced collectors. Jacobsen, 59 Nagle Ave., New York 34, N. Y.

FREE Packet with approvals. Robert Smith, 801 Market, McKeesport, Pa.

APPROVALS. Better grade. On request. Attractive prices. References. A. M. Shill, 502 Park Ave., N. Y. 22.

UNITED STATES and Foreign stamps on approval. Denison Stamp Co., 119 Chestnut, Denison, Texas.

SPECIAL packet 15c to applicants for dependable approvals. Standard, 3817 Sackett, Cleveland 9, Ohio.

BRITISH Colony 25 different 10c with approvals. Pelican Stamp Co., 1609 S. W. 8th St., Miami 35, Fla.

EXCELLENT Pictorial approvals. Reasonably priced. Crown Stamp Co., Box 331, Toronto, Canada.

LATIN-AMERICA 65 Diff—Pictorials, Airs, etc., 10 countries 10c with approvals. Crescent Stamps, London, Canada.

UNITED Nations, scarce 5c U. S. Commemorative and packet 30 different U.S., including Airmail, Commemoratives, Revenues, etc. Catalogs 65c—to approval applicants for 5c. Curhan Stamp Company, Dept. G., Gloucester, Mass.

LIBERIAN Triangulars. Set 10c with approvals. Vargo Stamps, 6044 S. Fairfield, Chicago 29, Ill.

BECHUANALAND Protectorate, gorgeous Tongs, exotic Pitcairn Isle, beauteous French Colonies—Everything 3c with approvals! Saxon Co., Walden, New York.

10 DIFFERENT U. S. Over 40 Years Old, 5c. Foreign, U. S. approvals. Scott, 30 Baker Ave., Lexington 7, Mass.

COMPLETE Set 5 beautiful pictorials 6c with approvals. I. Tesmer, 201 Lemon St., Buffalo 4, N.Y.

25 DIFFERENT Canadian, 5c to serious approval applicants. All priced approvals. Moderne Stamp Co., 2037 Ames St., Los Angeles 27, Calif.

HITLER HEADS! 9 Different, 10c, to approval applicants. Riverside Stampco, Box 1565, Miami 35, Florida.

33 DIFFERENT U.S. including 19th and 20th Century commens-regular issues. $1.00 stamp included. All free to U.S. approval applicants only. Mendelson, 5410 Beverley Road, Bklyn. 3, N. Y.

FREE—18 Different Switzerland with approvals. Excel Stamp Service, Box 1315, Chicago 90.

1000 U.S. Mission mixture 25c Monjar, 1750 Fairmount, Cincinnati, Ohio.

PRIME Packet, good ones only, 50c. Ellis, 52 Edmonton, Winnipeg, Canada.

POSITIVELY Greatest free offer—Latest Scott's International $5.00 stamp album —covering entire world, contains 36,000 illustrated descriptive spaces; Scott's 1946 Standard $5.00 catalogues "Philately's Encyclopedia"—absolutely free to applicants for foreign approvals becoming customers. Plymouth Specialty Company, Dept. A 3, Bell, California.

US commemorative packet only 10c. Imperforate, Nineteenth Century and other obsolete. 75 different US including Civil and Spanish War Revenues, commemoratives, Airmails 25c. 200 Different $1.00. To approval applicants. AAA Stamp Company, Arcade Bldg., St. Louis, Mo.

"ITALY-BANDIERA Faschists? three stamps complete 10c to approval applicants Astoria Stamp Exchange, Box 25, Woolsey Station, L.I.C. 5, N. Y."

FREE! Two Cuba Imperforates ½c up. Approvals Marjay, Box 14, Station B, Brooklyn 16, N. Y.



Copyrighted material

## 129 TATTOOING SUPPLIES

TATTOO Outfits, inks, designs. Write today. Zeis Studio, 728 Leslie, Rockford, Illinois.

DIAMOND Point Electrograver for all types Freehand Engraving. Also tattoo equipment, supplies. Send for free Literature. Moore, 651 S. State, Chicago.

## 131-A TENTS

THESE lightweight Paulins make a splendid waterproof tent or leanto. Made of rubberized Fabric, they are yellow one side, blue on other. Size 7 ft. x 10½ ft. Weigh only 3½ lbs. Equipped with 20 grommets. Tent size 7' wide, 7' long, 4' high. Poles, stakes, ropes and flaps not included. Ask for Stock #77, $12.95 postpaid. Army mosquito headnets 95c. Plastic Wrist Compasses $3.50. Floating Flashlights with two bulbs and battery $1.50. Karl Ort, Dept. PS-8, York, Pa.

## 132 TOBACCO & PIPES

CIGARETTES—popular brands; minimum 3 cartons. Price $1.35 per carton, postpaid. Send check or money order. Ace Mail Order Co., East Orange 82, N. J.

CIGARS $2.95 up, box 50. Wholesale and retail. Free price list. Zibar, Roselle 2, N. J.

## 134 TREASURE FINDERS

NEW powerful Goldak locators for metals and minerals again available. We are the world's largest manufacturer of fine locators. Goldaks have always been the world's champion locators and always will be. Every Goldak, even our lowest priced model, is moneyback guaranteed to detect buried Gold, Silver, metal or minerals at greater depth than any other locator regardless of vague claims, price or design. When you get a Goldak you are certain of the finest. Write The Goldak Co., 1544 W. Glenoaks, Glendale 1, Calif.

MT-SCOPE Metal Locator fully guaranteed and unsurpassed in efficiency. Time payment plan, trade-in and accessories. Free literature. Fisher Research Laboratory, Palo Alto, Calif.

MAGIC Indicator, locates buried money and Mineral Deposits. $20.00, Guaranteed. C. W. Horton, Bellerive, Ill.

SEVENTY land-sea treasure locations. Map, Signs, Geological data, pamphlet, $3.00. George Patterson, 47 Elmira, Brighton 35, Mass.

## 136 TYPEWRITERS

USED Typewriters, Mimeograph, Multigraph Office Appliances, supplies. Dixie Graph, King, N. C.

## 137 VOCATIONAL GUIDANCE

DISCOVER your best abilities through scientific aptitude tests. Information 10c. Testing Service, 420-A2 Gas-Electric Bldg., Rockford, Illinois.

NEW writers and artists wanted for magazines, newspapers, books, radio and advertising. Send for free Ability Prover. Guidance Center, Fort Thomas 6, Kentucky.

## 138 WANTED MISCELLANEOUS

MERCURY—Highest prices. Free Containers. Write Mercury Terminal, Norwood, Mass.

USED playing cards. Any quantity. Harry Krings, 325 E. 24th St., New York 10, N. Y.

SMALL optical shop wants work manufacturing lenses and prisms, also repairing instruments. Write for any information. Edwin Calkins, 192 E. Winspear Ave., Buffalo 15, N. Y.

FOREIGN Military Souvenirs; metal emblems only. Hobbyguild, 35c W. 32nd St., New York.

## 138 WANTED

WATCH and clock repairing — complete practical course in modern horology. 66 illustrated self-instruction lessons. Just out! Low price. Fascinating 100-page illustrated catalog Free! Write—Nelson Co., Dept. 8-01, Chicago 5.

SEND $2.20 for high grade gents Stainless Steel Expansion Watch Band. Lowe's, Holland Bldg., St. Louis 1, Mo.

WATCH and clock repairing increasing, complete home study course with drawings and pictures. Information free. Houston Chronomatic and Watch Co., P.O. Box 5367B Houston 12, Texas.

BIG Money in Watchmaking, repairs, adjustment. Learn this profitable trade at home. New, complete "Practical Course" for beginners, professionals, fully illustrated, only $2.95 postpaid. Money back guarantee. We supply tools, materials at lowest cost. Modern Technical Book Co., Dept. M3S, 55 W. 42nd St., New York 18.

BEGINNERS Jeweled Pocket Watch Movements is $2.00 Each Bezkor, 1491 Metropolitan Ave., New York 62.

## 140 WELDING, SOLDERING

NEW Model electric welder 110 volt AC-DC; will weld all metals; easy to use, full directions. Complete with power unit, flame and metallic arc attachments, carbons, fluxes, rods, mask; all for $19.95—Used by the Navy. Magic Welder Mfg. Co., 239-PS-5, Canal St., New York City.

"THUNDERBOLT"—Transformer welder, dial-control, 3 heat stages, 60 amps, 110 volts-AC, takes up to 3/32 Rod, carrying case, all accessories, illustrated instructions. Professional heavy duty welding, brazing outfit. $39.50. Also light-work welder, 110-Volts, AC-DC, $19.95. Save 2%, send check. Or order C.O.D. Super-Welder Mfg. Co., Dept. PSC, 23 E. 20th St., New York 3, N. Y.

WELDERS, Burners, Pipefitters—Don't lose out in the keen postwar competition. Learn Welded Pipe Fabrication by mail from an expert fabricator. Easy terms. Art Berry, 3623 No. St., Baton Rouge 9, La.

WELD Pot Metal Braze Aluminum Easily with commando. Trial Package with directions $1.00. Ragle Industries, 4029 S. Indiana, Kansas City 4, Mo.

WELDING shops build all steel rubber tired farm wagons, two wheel stock, dual wheel tractor trailers, plans $1.00 each, all three $2.50. "Doc" Fixit's, Mt. Vernon, Ohio.

WELD, cut braze with gasoline! Matthews Mfg. Co., Calgary, Canada.

OLD Blacksmiths Secrets Forge, Harden, Temper Steels Booklet 50c. P.O. Box 342, Mishawaka, Indiana.


# AUDELS Carpenters and Builders Guides

## 4 vols. $6

**Inside Trade Information** for Carpenters, Builders, Joiners, Building Mechanics and all Woodworkers. These Guides give you the short-cut instructions that you want—including new methods, ideas, solutions, plans, systems and money saving suggestions. An easy progressive course for the apprentice and student. A practical daily helper and Quick Reference for the master worker. Carpenters everywhere are using these Guides as a Helping Hand to Easier Work, Better Work and Better Pay. To get this assistance for yourself, simply fill in and mail the FREE COUPON below.

**Inside Trade Information On:**

How to use the steel square—How to file and set saws—How to build furniture—How to use a mitre box—How to use the chalk line—How to use rules and scales—How to make joints—Carpenters arithmetic—Solving mensuration problems—Estimating strength of timbers—How to set girders and sills—How to frame houses and roofs—How to estimate costs—How to build houses, barns, garages, bungalows, etc.—How to read and draw plans—Drawing up specifications—How to excavate—How to use settings 12, 13 and 17 on the steel square—How to build hoists and scaffolds—skylights—How to build stairs—How to put on interior trim—How to hang doors—How to lath—lay floors—How to paint

**THEO. AUDEL & CO., 49 W. 23rd St., New York City**

Mail Audels Carpenters and Builders Guides, 4 vols., on 7 days' free trial. If O.K. I will remit $1 in 7 days, and $1 monthly until $6 is paid. Otherwise I will return them. No obligation unless I am satisfied.

Name.....

Address.....

Occupation.....

Reference..... P.S.M.



# Flash! Amazing Opportunities NOW Open in these practical money-making trades

## watch and clock repairing

**LEARN AT HOME—IN YOUR SPARETIME**

Prepare for a happy future of prosperity, security...and get a big-pay job now. Fascinating, high-grade occupation. You can EARN WHILE YOU LEARN. Excellent field for part-time work at home.

**COMPLETE COURSE in HOROLOGY**

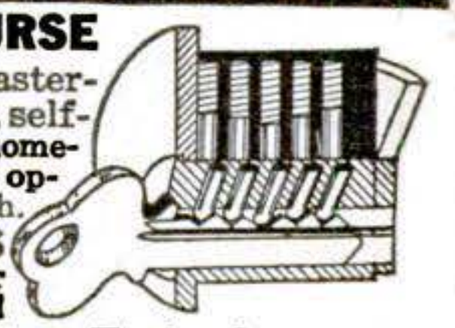
Thorough self-instruction training in American and Swiss watches, clocks. Special sections on alarm clock repairs. New, practical LEARN-BY-DOING instruction method. Learn **QUICKLY,** easily. No previous experience necessary. Watchmaking is basic training for aircraft instrument work, and other scientific precision jobs.

***Amazing LOW PRICE • MONEY-BACK GUARANTEE***

Get into this fast-growing field NOW . . . big opportunities . . . don't delay. Mail coupon below for **FREE** information. There's no obligation.

## locksmithing and key making

**COMPLETE UP-TO-DATE COURSE**



How to pick locks, de-code, make master-keys, repair, install service, etc. New, self-instruction lessons for every handy man, home-owner, carpenter, mechanic, service station operator, fix-it shop, hardware dealer, gunsmith.

**53 EASY ILLUSTRATED LESSONS**

Bargain Price! Satisfaction guaranteed or money back. Write now . . . no obligation!

***Free Details—Mail Coupon Today!***

**NELSON CO., Dept. 2E01, 1139 S. Wabash Ave., Chicago 5, Ill.**

Please send me—FREE and without obligation—illustrated Success-Catalog containing information about the course (or courses) I have checked below. No salesmen will call.

☐ Watch and Clock Repairing. ☐ Locksmithing and Key Making.

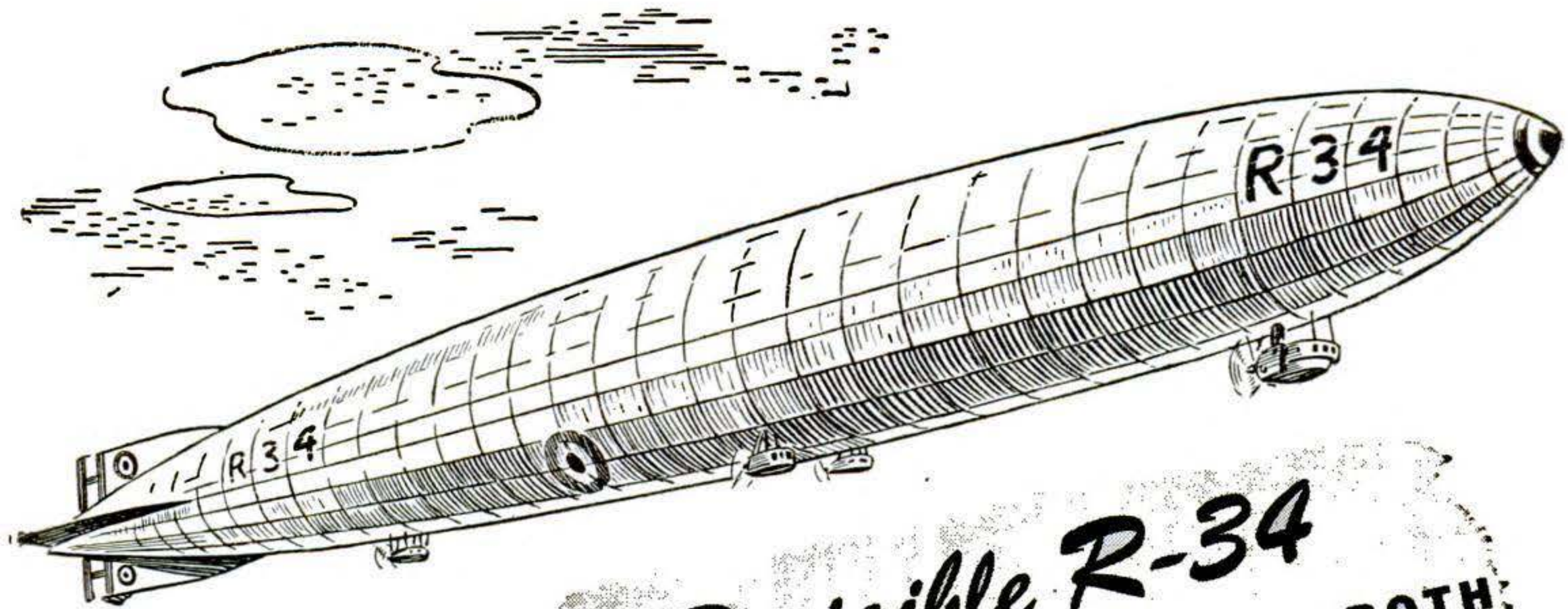
NAME_____

ADDRESS_____

CITY_____ STATE_____

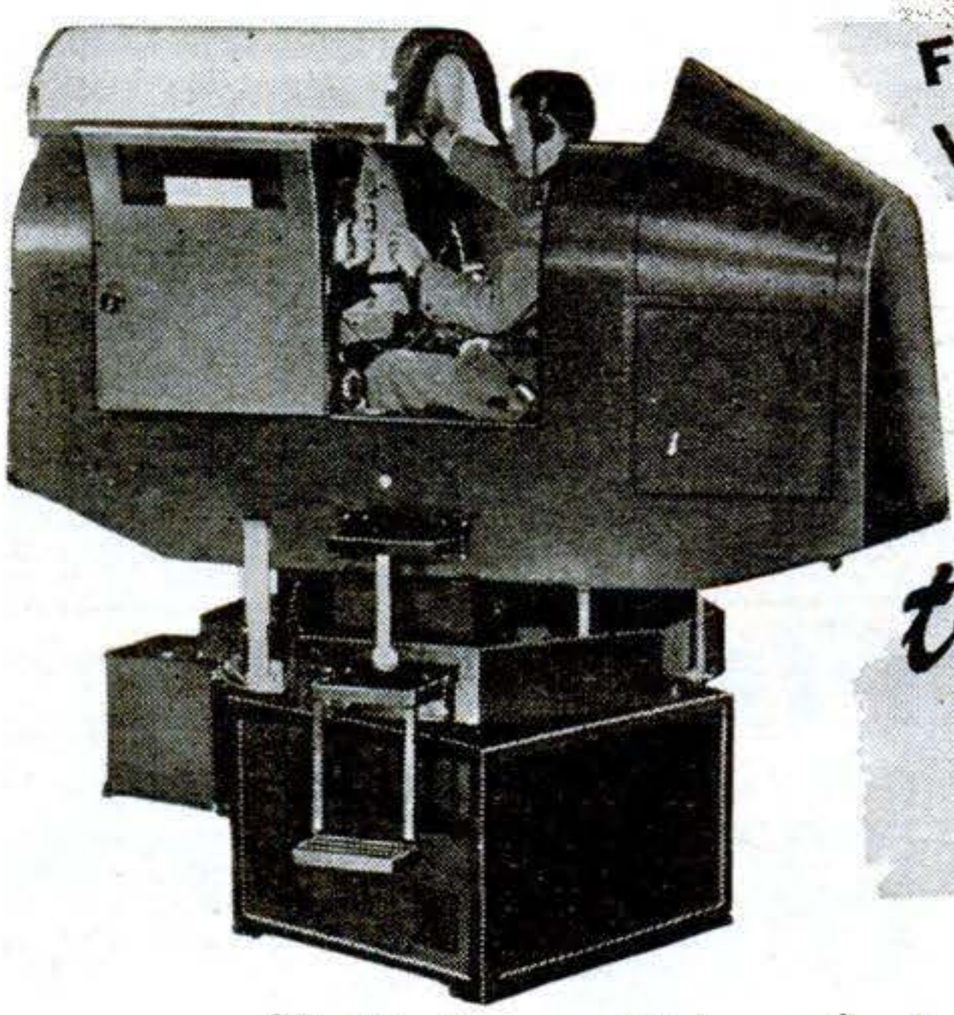



Copyrighted material




# Dirigible R-34

**FIRST CRAFT TO FLY BOTH WAYS ACROSS THE ATLANTIC**

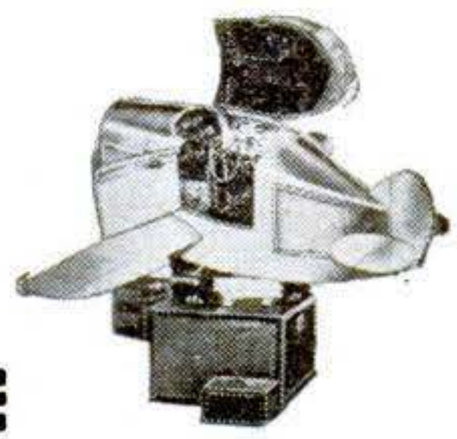


# the Link

**FIRST SUCCESSFUL DEVICE TO SIMULATE FLIGHT**

First to fly round-trip across the Atlantic—the dirigible R-34 made history. The Link, too, is a famous "first"—first to *simulate* flight on the ground with all the realism of a plane in the air. The Link enables the beginner to develop an instinctive handling of airplane controls, and to absorb the fundamentals of flight.

The Link shortens your pre-flight training period by reproducing actual flight maneuvers—teaches you how to bank, glide and climb; and how to avoid stalls. You even learn how to fly on instruments through darkness and "weather," knowledge which will prove a vital asset to your future airmanship. Link training has long been standard with the Air Forces and the airlines. If you intend to fly, the Link will give you greater safety, skill, and range in your private plane. *Link Aviation Devices, Inc., Binghamton, New York. Makers of Link Trainers, Crew Navigation Trainers and other devices contributing to the safety of flight.*



## *Link training is your first step into the* FLYING AGE



Copyrighted material

POPULAR SCIENCE MONTHLY
MAY 1946

# BOARDS BIGGER THAN TREES

If this 78-foot plywood panel isn't long enough, house builders and boat makers can call for still bigger boards made possible by war-proved resins and advanced jointing techniques. For a detailed story of the growing low-pressure molding industry, of which plywood is a big branch, see "Plastics Go Big" on page 122.

Copyrighted material

# 50 FIFTY MILES UP

## This Summer "Corporal" Leads Assault on Ionosphere to Increase Our Knowledge of Weather and Radios

By JAMES L. H. PECK and KENYON KILBON

"WAC CORPORAL" is a slender rocket with an important research mission in the ionosphere. She already has streaked to altitudes of nearly 50 miles above her base at the White Sands Proving Ground, Las Cruces, N. M., to send back information from the lower fringe of the ionized layers surrounding the earth.

This summer, the Corporal and her sisters, the Wac Sergeant and Wac Private, are scheduled to zoom into the atmospheric desert lying from 35 to 500 miles above us on voyages that may be as historic as those of Christopher Columbus's three tiny ships in 1492. They will seek data needed to improve radio techniques, forecast the weather, and solve riddles as ancient as human thought.

The Corporal is a half-ton cylinder built of steel, aluminum and magnesium. From the tip of her needle-sharp nose, shaped to penetrate the shock waves that build up at supersonic speeds, she stretches 16 feet 2 inches past three stabilizing fins to the end of her rocket tube. Into her slim barrel, only 12 inches in diameter, are packed radar and secret devices designed to gather and transmit data to the base station during flight. These robots will be her only passengers when her masters step back from the steel framework that holds her upright on a concrete base in the desert and watch a flaming jet carry her into the unknown.

Scientists will send a great barrage of rockets into the upper layers of the atmosphere within the next few months. In addition to the Wacs, they have other highly secret projectiles, and plans call for the use of 25 reconstructed German V-2s. One U. S. rocket is reported to be able to reach the

Copyrighted material

80-mile level. The Wac Corporal already has climbed to 230,000 feet—43½ miles—and the V-2 is said to have reached heights of 60 to 75 miles over horizontal ranges of 200 or more miles during its wartime missions. With its energy directed toward attaining absolute altitude, V-2 may go higher.

Improved combustion chambers and fuel systems have been devised to fit the rockets for their long-range research flights. Although the details of those actually in use remain secret, patents recently granted to the late rocket-pioneer, Dr. Robert H. Goddard, of Clark University and Roswell, N. M., bring sparkles to experts' eyes. The patents cover a fuel system using gasoline and liquid oxygen, and a combustion chamber that spins like a top as the fuel burns. The fuel system has a small tank of liquid nitrogen enclosed in the oxygen container. The nitrogen is piped through a coil around the combustion chamber as a coolant, returning it to a gaseous condition. The gas is then piped to the gasoline tank, where it is used to maintain pressure equilibrium as the gasoline is withdrawn. The spinning combustion chamber, mounted in ball bearings, provides more rapid and efficient combustion.

Ingenious instruments and methods have been contrived, too, to speed data back to earth from the rockets. Radar can track the projectiles at their supersonic speeds, and sections of a rocket can be detached by radio control to parachute recording instruments down. These will include ozone analyzers and versatile ionization meters which gather facts about cosmic and ultraviolet radiation. Special glass-lined chambers which open and reseal automatically have been built to bring back samples of the upper atmosphere. Some of the rockets also may carry compact, wide-angle infra-red cameras to photograph the earth from extreme altitudes.

A few of the rockets may be destroyed by shattering collisions with meteors in the rarefied upper air. From 75,000,000 to 10,000,000,000 meteors are believed to enter the earth's atmosphere daily, at speeds as great as 180,000 miles an hour. Most of them are eliminated by friction in the atmosphere before they strike the earth, but a rocket penetrating to great heights runs the risk of encountering one still massive enough to be destructive.

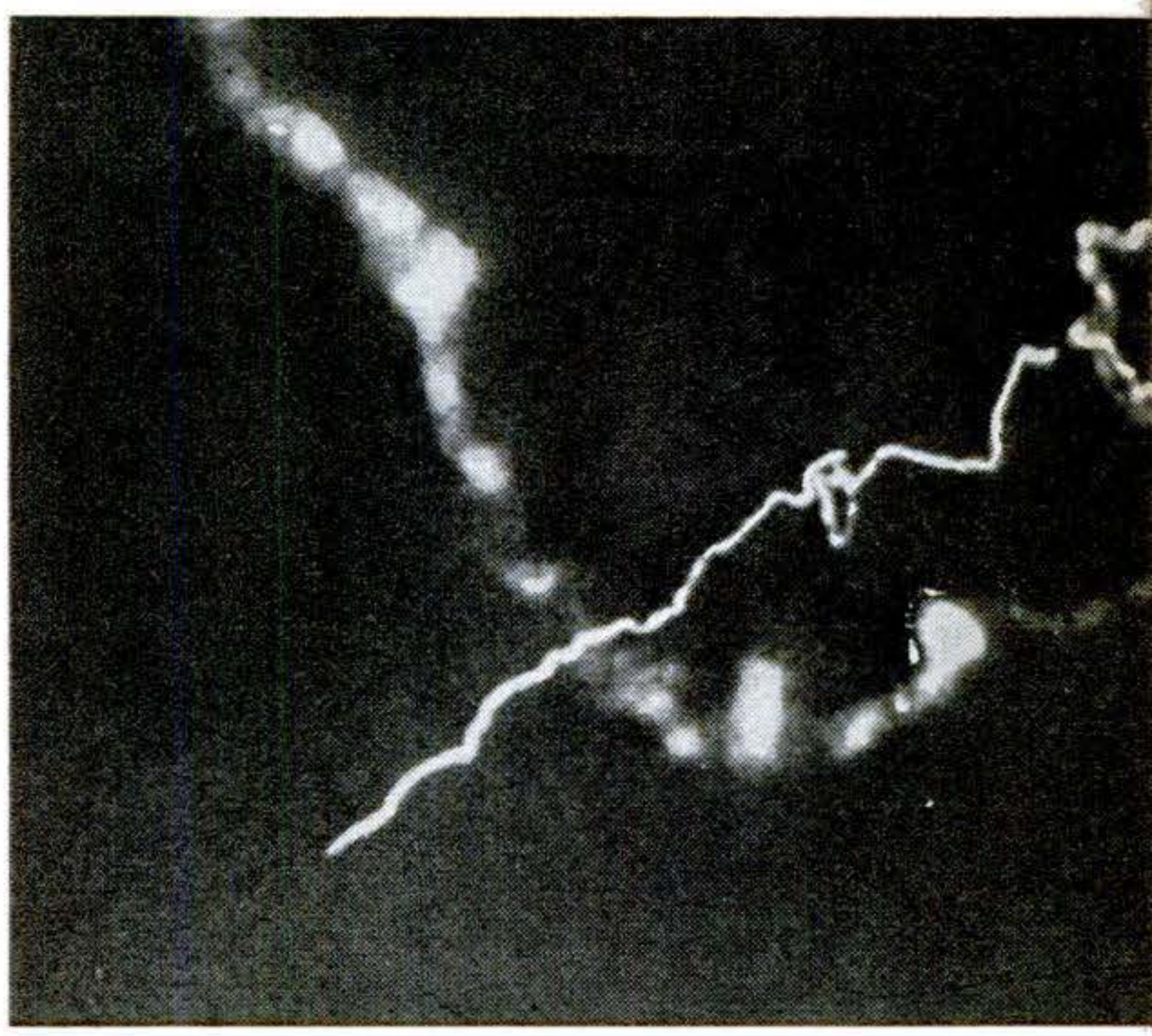
The evidence brought back by the rocket-borne instruments may affect many of our theories and deductions about the earth's atmosphere. Scientists now picture a series of adjoining layers surrounding the globe. They have designated the known layers by the letters C through F, beginning at the earth's surface, allowance having been made for the possible designation of additional levels below C or above F.

The outer layers, D, E and F, show the effects of constant exposure to the bombardment of ultraviolet radiations and charged particles from the sun, the stars and even meteors. If it were not for the atmosphere, the intense radiation would extinguish life on earth, but the coating of air filters and absorbs them to the point of safety. In the process, however, the outer atmosphere takes on the peculiar characteristics that identify the ionosphere.

When the ultraviolet light from the sun encounters the gaseous atoms of the outer air, ionization takes place on a grand scale. The result is not an explosion such as men have obtained from atomic fission, but a steady process of electron detachment and recombination among the atoms of the rarefied atmosphere. Under the bombardment, electrons are torn from their atoms, leaving the outer air filled with free electrons and unstable atoms, or ions, which attract one another and tend to rejoin because of their opposite charges. Where the atmosphere is rare, distances between atoms are relatively great, and recombination does not take place as rapidly as in the denser air of lower altitudes.

This vast ionized region was studied independently in 1902 by an American and a Briton, who found that it reflected radio waves transmitted from the earth. They discovered that the waves, encountering the electrified fields far above the earth, were refracted or bent around to return to earth

Though the "Wac Corporal" was roaring straight up when this picture was taken by an Army newsreel cameraman at the New Mexico tests, its exhaust trail looks erratic. That is because it was blown by varying winds at different altitudes.





Copyrighted material

again, perhaps at great distances from the point of origin. In honor of the two scientists, the ionized region was named the Kennelly-Heaviside Layer.

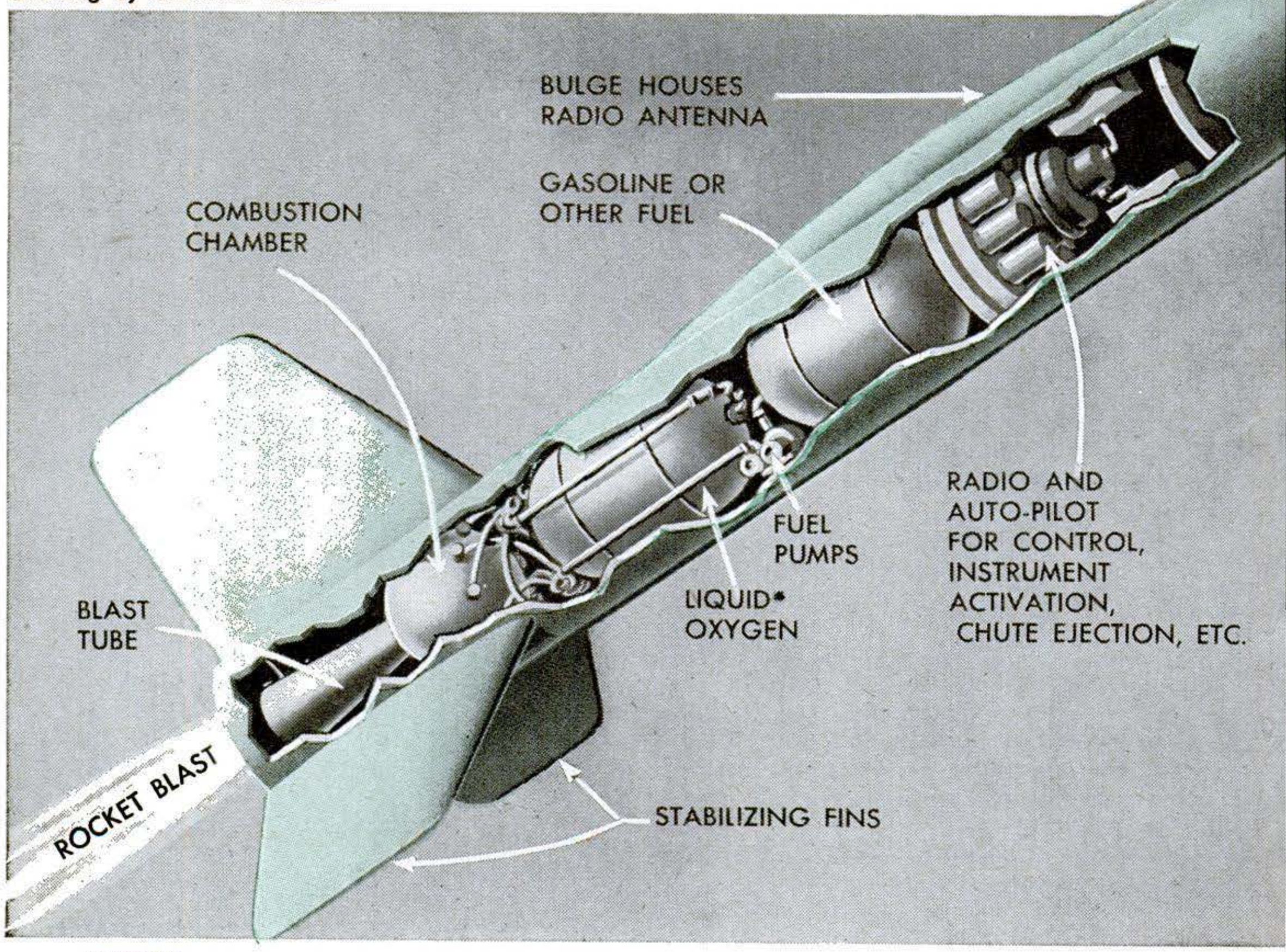
Later research disclosed that ionization in the upper air did not occur uniformly, but in strata, with the upper layers more intensely ionized than those nearer the earth. Radarlike "ionosphere recorders," capable of sending high-frequency radio waves through the electrified regions, revealed the approximate depth of each of the layers, and the present conception of the ionosphere resulted. The high-altitude sounding rockets will bring back more accurate information.

If not already built, a super-rocket capable of reaching the topmost layer is likely to be developed soon. Such a rocket, fired from a vertical launching rack, will streak up to the C layer, from 20 to 35 miles above us. There it may encounter a small amount of ionization, but it will not be in the true ionosphere until it enters the D region, about 35 miles up. Flashing through D, which reaches on to 50 miles, the super-rocket will record ionization strong enough to reflect long-wave radio transmissions of low frequency between 20 and 500 kilocycles during the daylight hours when solar radiation is present. During the hours of darkness, the D layer almost entirely disappears.

Above the D layer, the rocket will penetrate the E region, the original Kennelly-Heaviside Layer, which extends on upward to about 90 miles. Here instruments in the rocket will record ionization that still is relatively weak, although stronger than that in the D layer. During daylight, medium-wave broadcasts between 500 and 1,500 kilocycles—the commercial band on your home radio—are absorbed by the E layer. At night, with the interruption of solar radiation, ionization in this region, too, virtually disappears, permitting long-distance night-time transmission of "broadcast" waves by F layer reflection. During the summer months, the rocket also may encounter a ghost region called the "sporadic E," which appears unpredictably and frequently at altitudes as low as 60 miles.

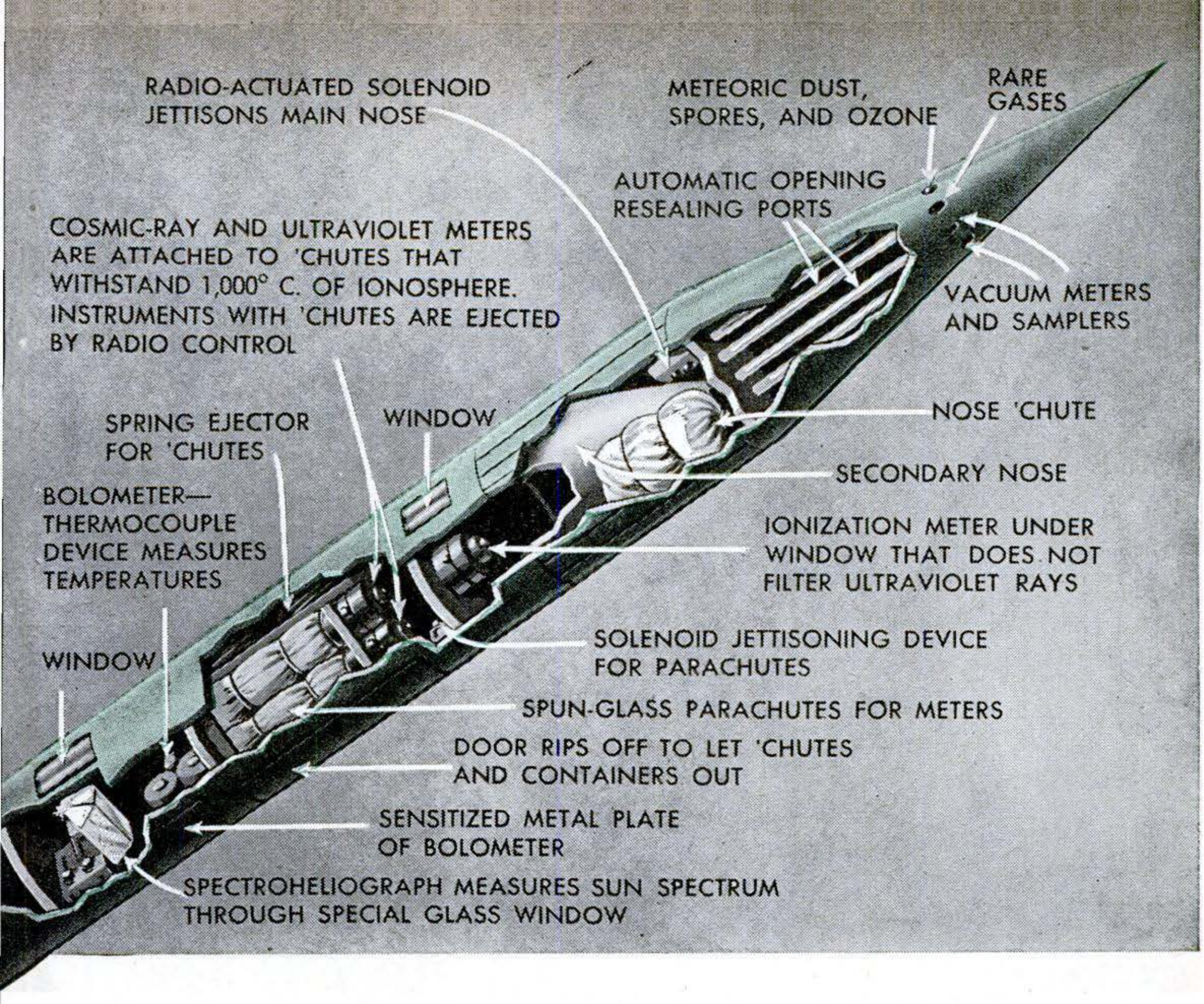
Above the 90-to-100 mile level, the super-rocket will bore into the F region, which scientists believe to be the outermost ionized layer. During daylight, F consists of two layers, and the rocket will enounter first the $F_1$, or Appleton, layer, whose lower limit averages about 100 miles of altitude. Beyond it, starting at 160 to 220 miles, depending upon the season, the rocket will penetrate $F_2$, extending outward to perhaps 500

*Drawing by STEWART ROUSE*






Copyrighted material




miles. At night, the two layers merge into a single belt whose lower surface is about 170 miles up. At this altitude, the atmosphere is so rare that recombination of ions and free electrons takes place slowly, leaving sufficient ionization during darkness to reflect the short-wave transmissions of more than 1,500 kilocycles that pass through the lower ionized layers.

Beyond the F region, where the temperature may rise to 1,000° C., the rocket will find incredible cold and silence. The temperature in that stellar space, scientists believe, is always -459° F., the "absolute zero" at which all molecular motion ceases and through which only things that need no conducting medium may pass.

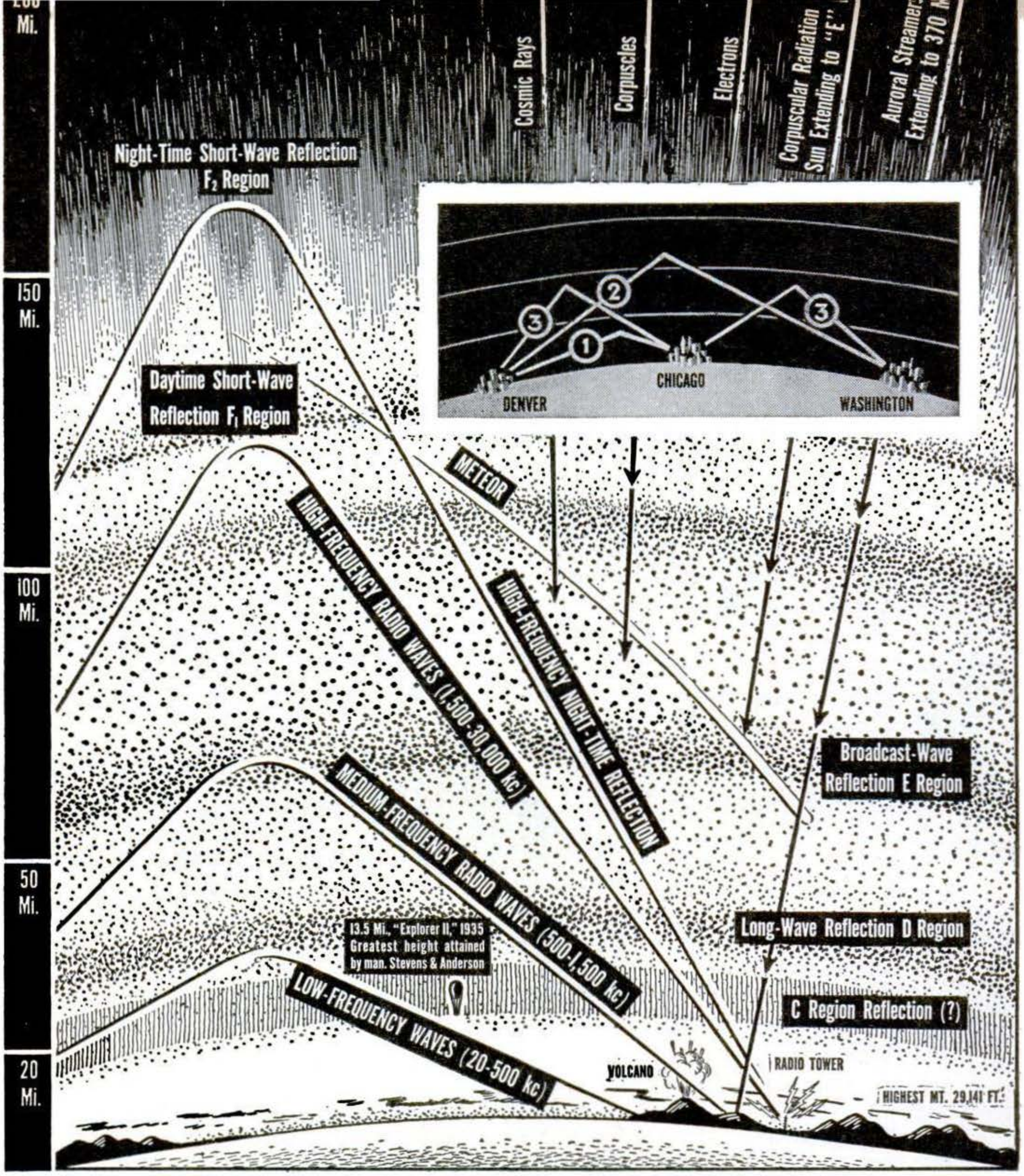
Already the outermost limits of the ionosphere have been left behind by high-frequency radio waves, including those of the ionosphere recorder and the famous "moon radar." One of the most significant features of radar contact with the moon, incidentally, was its demonstration that the ionosphere can be penetrated from the outside by radio waves. This has stimulated research regarding proposals to "bounce" signals off the moon from one city to another on earth.

The sounding rockets, with their unprecedented vertical range, should reveal much about the nature of the ionosphere as a shield protecting the earth from the intense bombardment from outer space. The filtering action of the ionized layers on external radiation is believed to be similar to that affecting radio waves from the earth. Certain of the cosmic radiations are absorbed or reflected by the F and E layers, while others are able to penetrate only in quantities harmless or beneficial to life. Cosmic rays, which may have some influence on life by disturbing hereditary factors in organisms, arrive from unknown distances with force enough to penetrate the ionosphere, but even they are filtered to the point of safety.

Periodically, the ionosphere is disturbed by tremendous magnetic storms. During these cycles, scientists have discovered, there is actual contact between the earth and the sun, which sprays forth great streams of charged particles that reach the earth's outer atmosphere in about 30 hours. The electron stream is believed to gain its terrific velocity from a powerful magnetic field around the gaseous whirlpools sometimes visible as sunspots. The additional ionization caused by these particles in the ionosphere is believed to be the reason for the spectacular aurora borealis and its



Copyrighted material




This cross-section drawing shows the layer-cake pattern of the atmospheric regions girdling the earth. Using these layers of ionized air, radio transmission becomes like an electronic game of three-cushion billiards in which low-to-high-frequency waves are "banked" to points beyond the horizon (see inset) —often halfway around the globe. "Wac Corporal" and other super-rockets will explore the make-up of these regions.

southern companion, the aurora australis. The sensitive ionization meters in sounding rockets sent aloft during such magnetic storms may record the exact degree of added electronic activity and disclose for the first time the mysterious nature of the aurora.

Analysis of the auroral colors already made from the ground indicates electrical discharges in oxygen and nitrogen particles as the cause of the fireworks, which reach down into the D layer and rise as high as 250 miles. The aurora borealis, incidentally, has shown an unusual shade of green which was once thought to represent a new element. However, this has been positively identified as a radiation from atomic oxygen, this particular color occurring only in the relatively undisturbed conditions characteristic of the outermost portions of the earth's atmosphere.

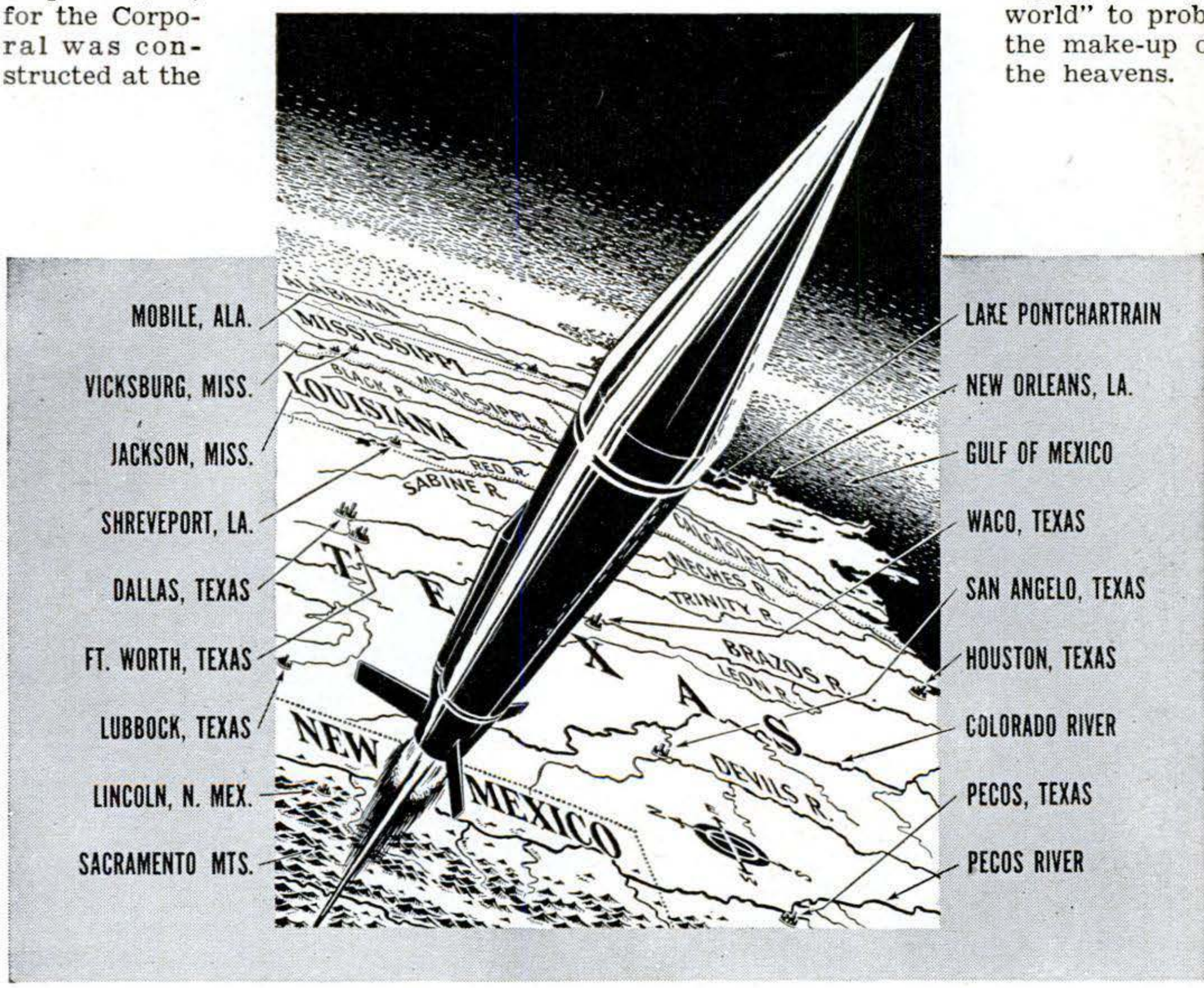


Copyrighted material

Another important mission of the sounding rockets will be to measure temperatures at various levels. Estimates of atmospheric structure already have been made under laboratory conditions, but the scientists are anxious to check their results against precise measurements by instruments borne into the upper air.

Whether the rockets will provide the answers to all of the mysteries remains to be seen, but science is placing great faith in them. Work continues at the Jet Propulsion Laboratory at California Institute of Technology, where civilian specialists and Army ordnance experts developed the Wac Corporal and her secret sisters as a part of the "Ordcit" (Ordnance-California Institute of Technology) program under the general direction of Dr. Theodore von Karmen, aided by Col. B. S. Mesick. The aviation industry is involved in the picture, too, for the Corporal was constructed at the Douglas Aircraft Company plant in Santa Monica, California.

The assault on the ionosphere does not depend on the rockets alone. Intensive research into ionospheric phenomena is under way in earth-bound laboratories, including the Interservice Radio Propagation Laboratory at the National Bureau of Standards in Washington, Harvard University's Cruft Laboratory, the Cosmic Ray and Radiation Laboratory of Massachusetts Institute of Technology, the laboratories of the Department of Research in Terrestrial Magnetism at the Carnegie Institution of Washington, and in laboratories in England, Canada and Australia. The Army already is operating a world network of observation posts established during the war to study ionospheric conditions for the benefit of long-range radio communication. Science has just started going "out of this world" to probe the make-up of the heavens.




## *Notice* to GI HANDICRAFT CONTESTANTS

**Judging of the many entries in the Servicemen's Handicraft Contest, which closed at 6 p. m., April 30, will take place on June 6 and 7 in New York City. All winners will be notified immediately after the completion of judging.**



Copyrighted material

# X-rays ANALYZE CHEMICALS AND MAKE THEIR OWN REPORTS

**Electronic Apparatus Saves Time and Test Tubes for Industry.**

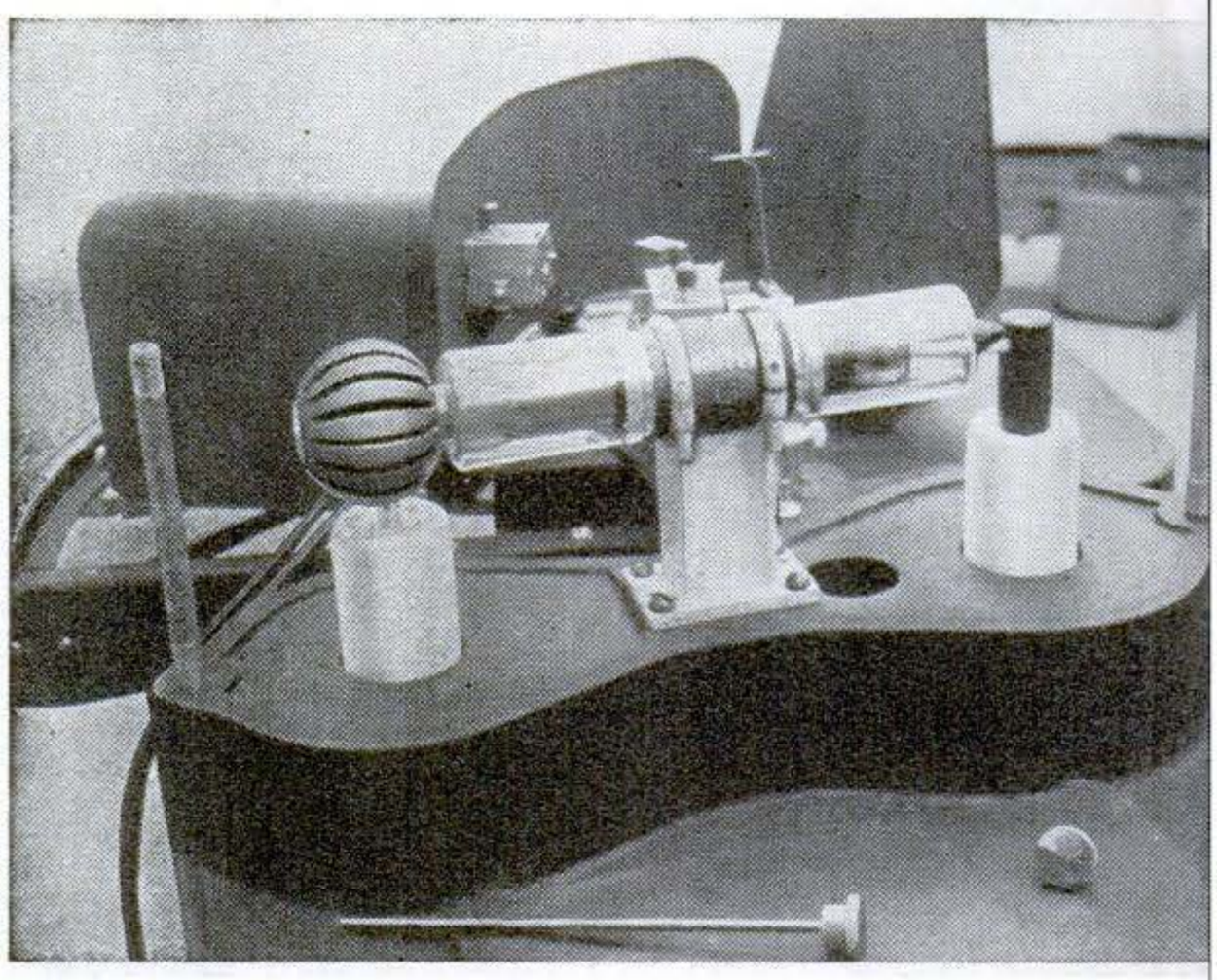
IMAGINE a chemical laboratory of the future: Gone are the "trains" of glassware, the test tubes, the liquids bubbling through test flasks. Instead, practically automatic electronic instruments pick up and record readings for the chief chemist. The walls are lined with automatic recorders from which he tears off teleprinted reports and telephones orders to a chemical mixing room Frequently his timely intervention saves a batch of alloy that otherwise would land in the scrap heap.

This does not mean that straight chemical tests are out of date; they will continue to be used for many purposes. But eagle-eyed physicists have been striving to outdo them. On X-ray diffraction they have pinned their greatest hopes. X-ray diffraction concentrates a "pencil" of X rays on the specimen. Rays bounce off in all directions. Formerly the record, a pattern of arcs, was inscribed on a band of film coiled within the outer wall of a drum-shaped camera. From this film record the expert could identify the various chemicals in the specimen and roughly estimate the amounts. Now the record appears on a moving-paper chart.

Probably the first major advance in years in X-ray diffraction has been the substitution of a Geiger counter for the camera. This device, more familiarly known as a means of registering cosmic rays, in its new function is known as the Geiger-Counter X-ray Spectrometer. It quickly analyzes boiler scale, paint pigments, precious and semiprecious gem stones, foreign deposits on valves and bearings, soils for agricultural use, cheese, asbestos, cellulose, cement, dry cells, rayon and rubber.

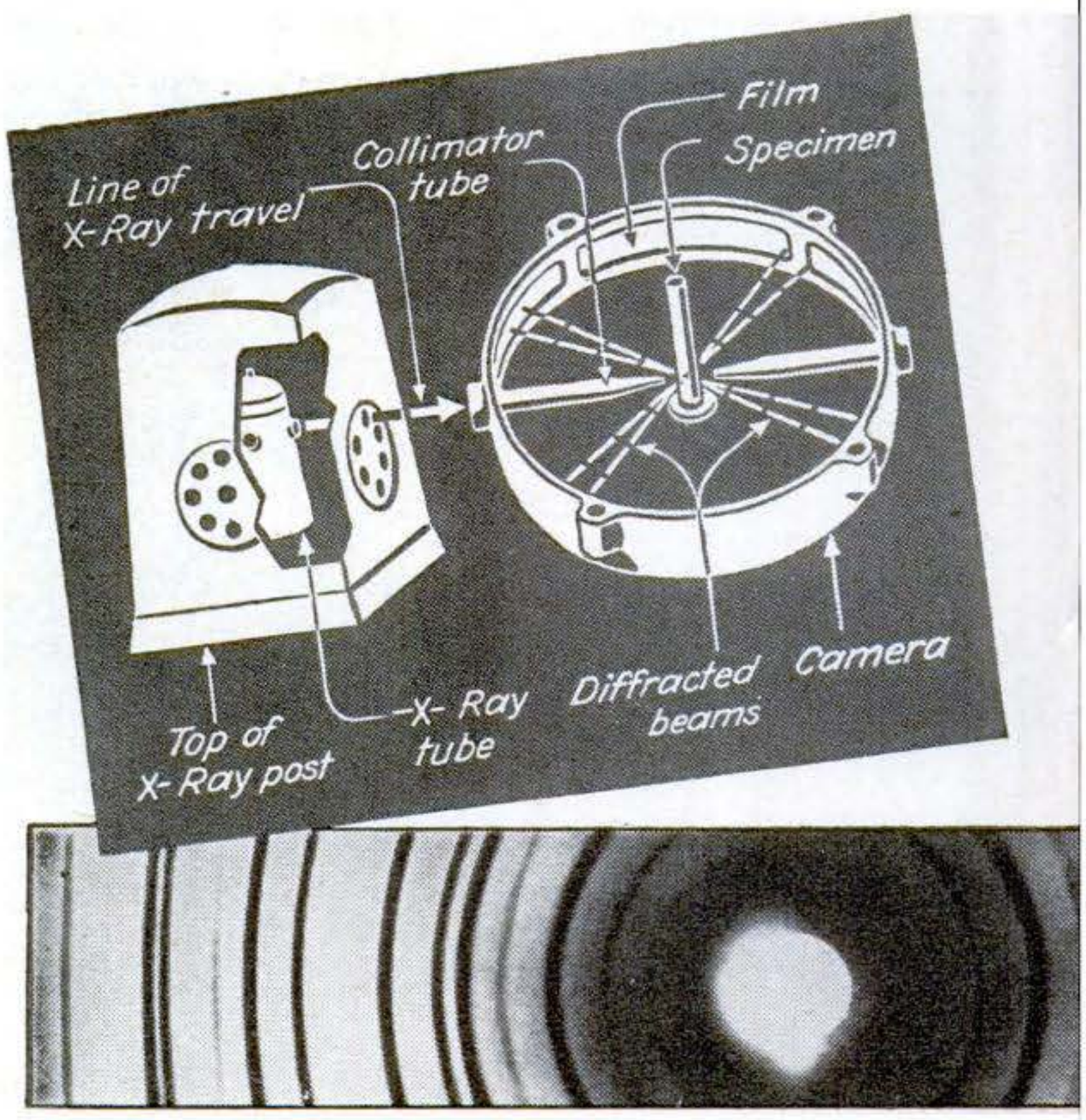
Equally interesting to an industrial chemist, analysis charts need not be sent to an academic laboratory for interpretation. Accurate to within one percent, they are often ready within 10 minutes. The X-ray Spectrometer also has been throwing new light upon how catalysts, the go-between agents of chemicals hard to join, may be "poisoned" and rejuvenated.

At present there is only one Geiger-Counter X-ray Spectrometer, at the New York City showroom of the North American Philips Co., Inc. Its sponsors hope soon to see hundreds in use.—ALDEN P. ARMAGNAC.



This X-ray tube, with cover lifted for inspection, was specially designed for use in the new electronic chemical analyzer. The principle dates back years to the first experiments with X-ray diffraction.

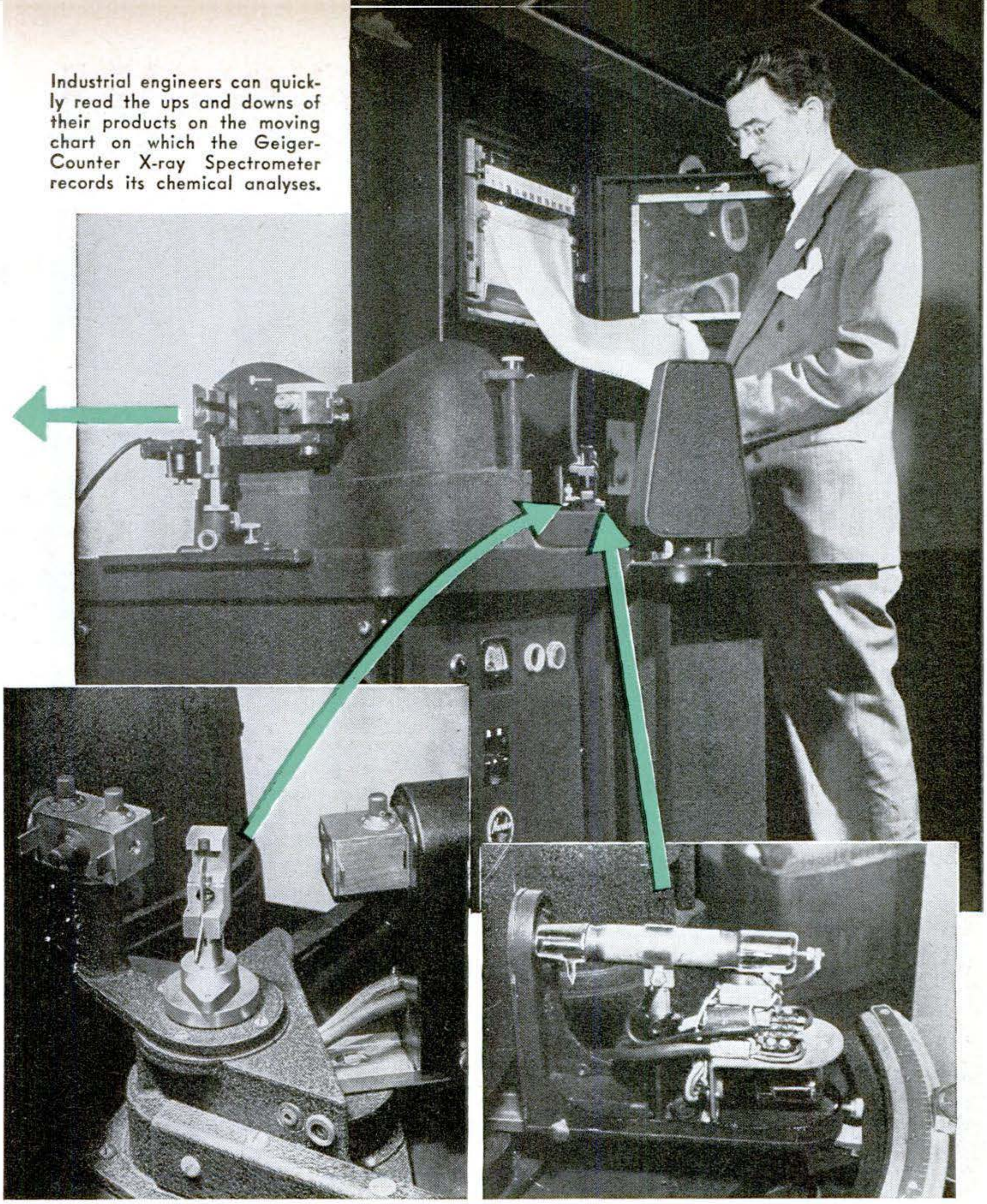
In earlier X-ray diffraction, rays led through a hole in a round camera (below) penetrated the crystal specimen at the center of it and rebounded to a film lining the wall of the camera. The film record (bottom of page) told experts what chemicals were present and roughly in what amounts. Darkest arcs in the pattern indicated greatest quantities.






Copyrighted material

Industrial engineers can quickly read the ups and downs of their products on the moving chart on which the Geiger-Counter X-ray Spectrometer records its chemical analyses.



In the vertical mount in the center, resembling a microscope slide, a crystalline specimen will be inserted for analysis. The window at left emits X rays, which then are bounced by the specimen into the window of the Geiger counter at right.

The Geiger counter, essential to atomic medical research (pp. 91-95), becomes an industrial tool for the first time in the new chemical analyzer. It picks up X rays reflected from specimen, translates its electrical impulses onto moving chart.



Copyrighted material

How the Fuller house, in its gleaming skin of aluminum, will look set up on a site. Vane on top deflects low-pressure areas that suck out heat.

# LIVING

FIFTY thousand $6,500 houses, looking like 36-foot dishpans bottom up, are scheduled for production next year in a Wichita aircraft factory. Engineered like an airplane, each will include a living-dining room, two bedrooms each with bath, and kitchen—complete with heating, plumbing, lighting, air conditioning and decoration. Beech Aircraft is to turn them out.

Engineer R. Buckminster Fuller has been rooting for such houses for 18 years. He designed them unlike any other dwellings, using the principles of suspension-bridge, not building, construction. Eight men can put up a Fuller house in two days—or take it down and re-erect as many times as you like. It will stand a 180-mile gale and five times its expected work load. Built of materials highly resistant to decay, weather and insects, it needs no paint and can be washed with a hose.

No whim, the hemispheric shape is the result of Fuller's efforts to evolve a durable shelter, requiring a minimum of upkeep, which would be pleasant, cheap—and much more efficient.

Cheapness meant mass production, meant light weight to permit continental distribution. The round shape, new materials, new design—all save weight. Only 13 percent longer than the walls of a conventional 25-foot square house, the 113-foot perimeter of the Fuller House encloses 54 percent more space. The shell is aluminum; skeleton, alloy steel; windows, plexiglas; floor, plywood locked with aluminum. Lucite, synthetic rubber, magnesium, nylon, fiberglas; all improve performance—and save pounds.

The walls and roof are hung from a central mast, like a tent. Three rings carry the load, the innermost suspended from the mast by a series of crisscrossed tension rods like the wire spokes of a bicycle wheel. The same device holds the outer rings, supports the floor, and anchors the bottom firmly to the ground. Aluminum skin covers the skeleton. Because the skeleton is stretched, the members can be made smaller; modern steel alloys have greater tensile than compression strength.

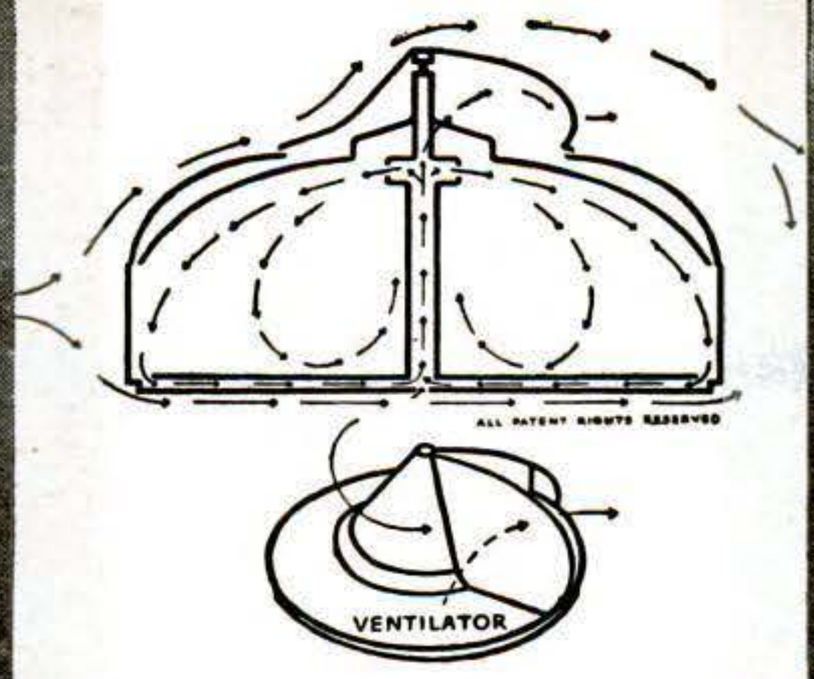
The shape saves heat. The average U. S. wind is 10 m.p.h. and every house has a low-pressure area to leeward which sucks out warm air through walls and windows. The Fuller's rounded skin minimizes drag; the revolving vane focuses the low-pressure area upward and away from the house. Gas, oil or electricity power the heating unit, located on the central mast. Cold air is pulled in beneath the floor, rises through the mast, is heated and expelled into the rooms, cools and sinks, then is sucked back to the center mast. Here the low-pressure area takes over, sucking the used air out through the roof vane.

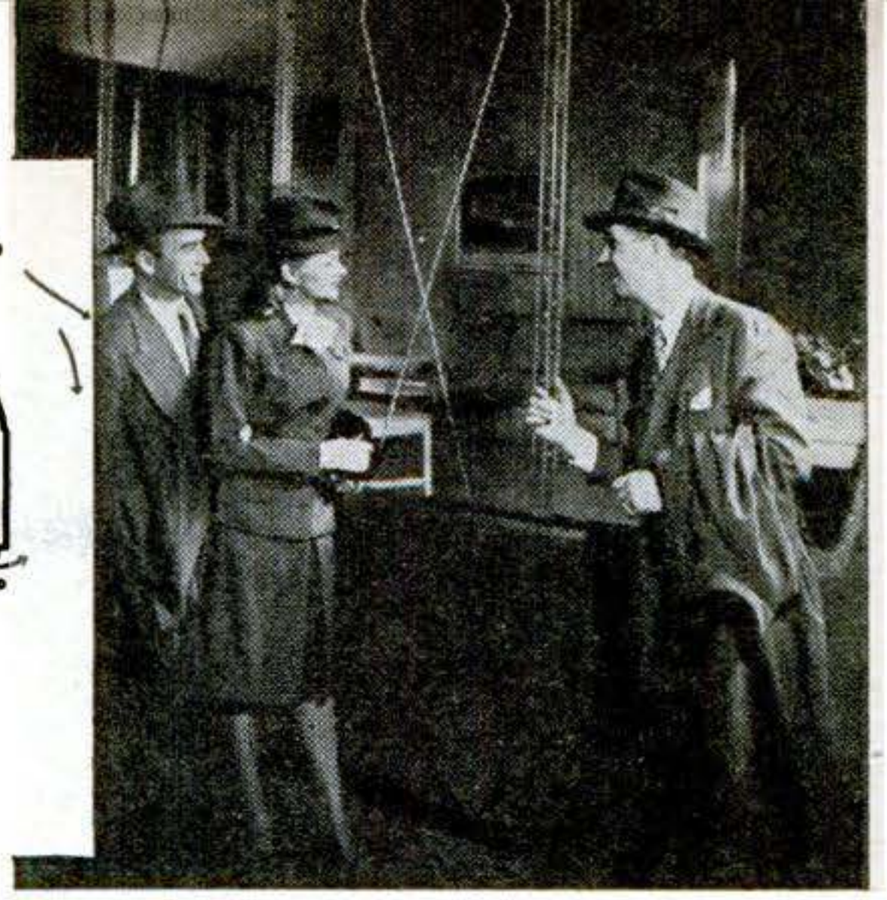
The aluminum sheets of the outer roof are laid with open expansion joints, permitting rain to run through onto the hollow ribs below, then down inside the roof to a gutter within the eaves.

The whole house weighs just 6,000 pounds, compared to 90,000 pounds for a frame house of the same size without foundation. With 1,000 pounds of equipment the Fuller house can be shipped in a 16-foot steel cylinder, 4½ feet in diameter.



Copyrighted material



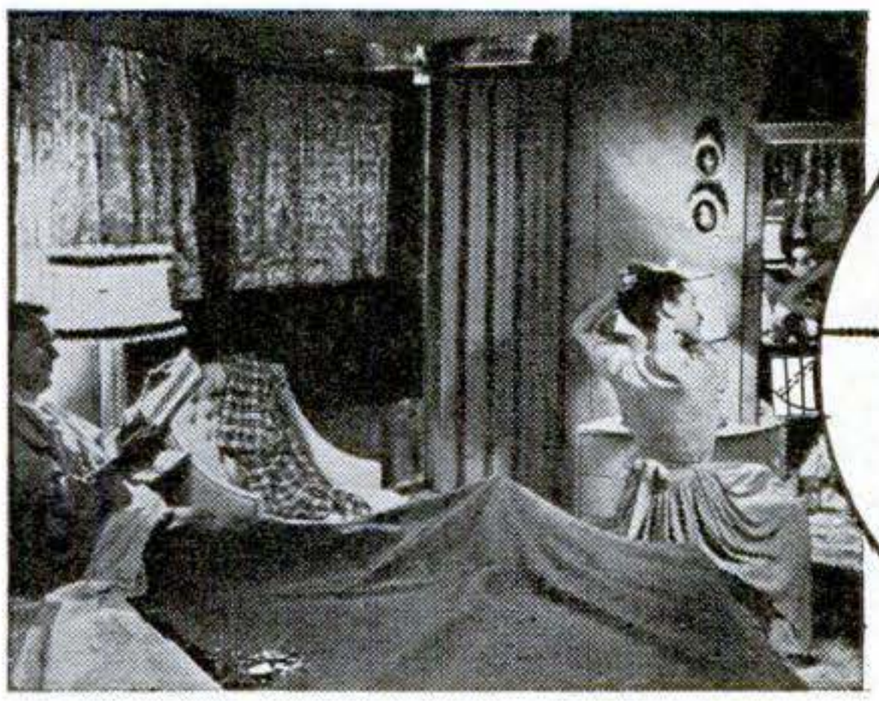
House has airplane-type doors. A 75% saving in winter heat bill is forecast. In summer, aluminum outer shell reflects sun's heat.

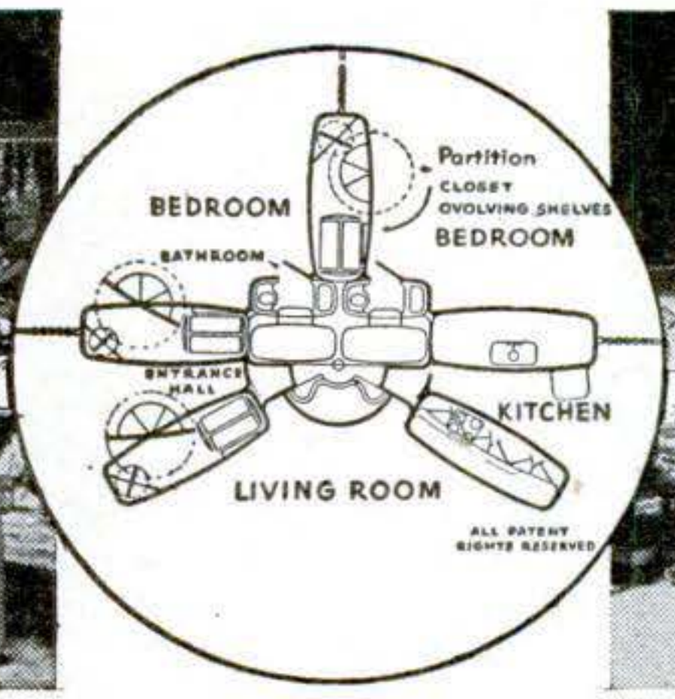
Air is circulated in fountain-like movement. Complete change takes six minutes, eliminating dust and germs.

Plexiglas windows encircle the house, are airtight and shatterproof. The crisscrossed tension rods hold up the floor, extend to ground anchoring.

# in CIRCLES

## Plane Makers to Roll Out Buckminster Fuller's Round House in '47

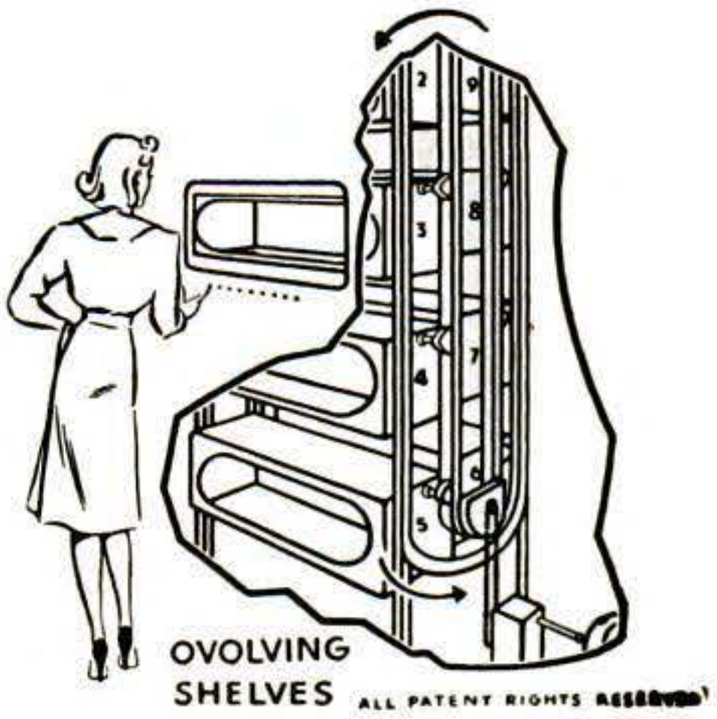




One of the two bedrooms, comparable in size to a room 14 x 15 ft. Wall panels are plywood and aluminum. Folding door is space saver.

Power, plumbing, ventilation ducts are grouped around central mast, other equipment in walls.

Living room has same amount of space as a room 21 x 16 ft. Wall below window has plastic-fabric covering. A pull-cord lowers it, exposing plastic screen.




Bathroom of aluminum and plastics has no cracks or corners to catch dirt. Washbowl will serve for baby's bath.

Closet doors revolve, swinging out semicircular clothes and shoe racks. There also are compartments for handbags, suitcases, plexiglas-enclosed hat racks.

House has three units of electrically operated "ovolving" shelves, each with 27 cu. ft. of space, equal to two bureaus.



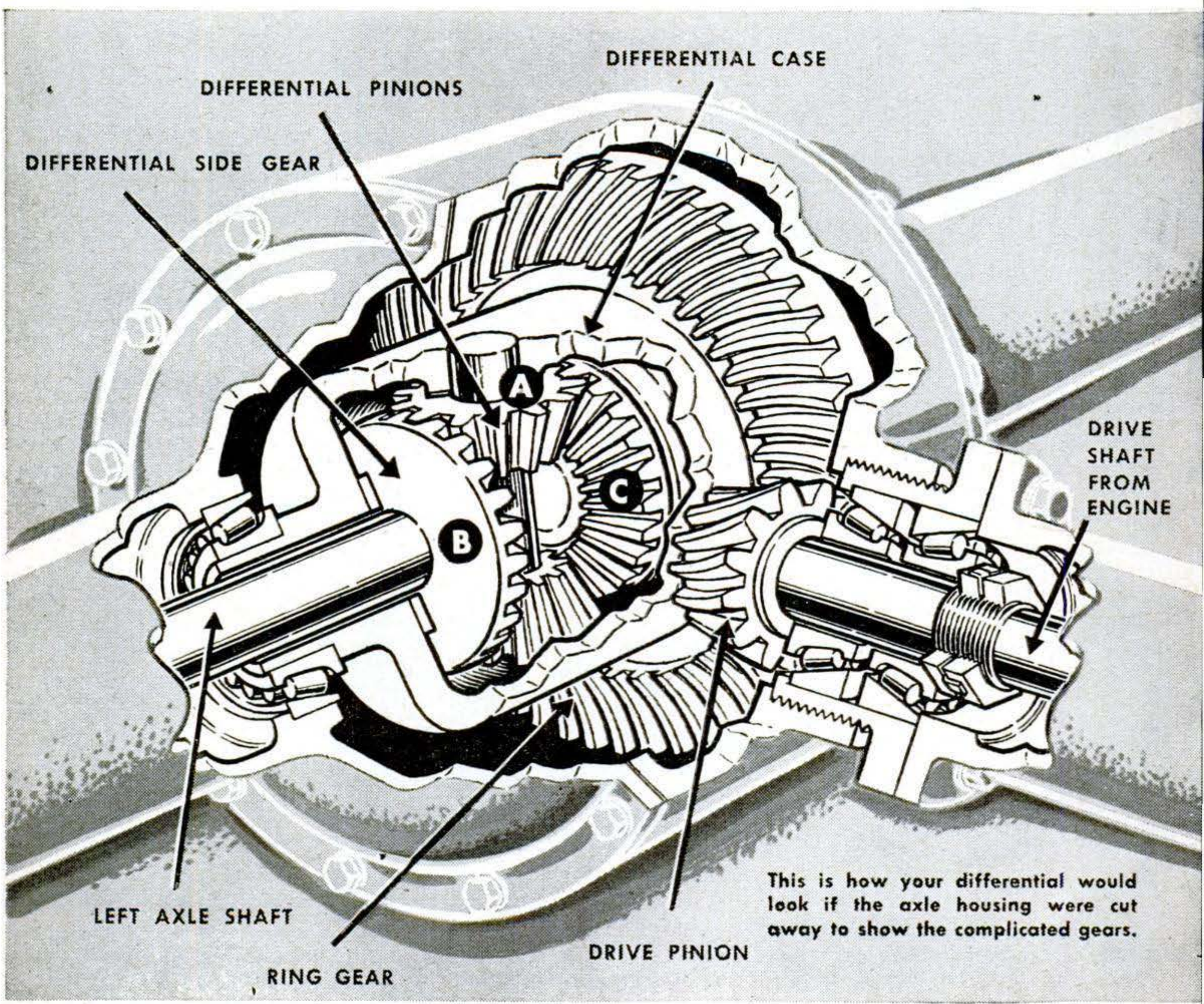
Copyrighted material

Mechanics of LIVING

# How Your Car turns corners

IF YOUR car had to travel only in a straight line, it could be almost as simple as an oldtime wagon. A basket full of gears, shafts, pinions, levers, and other parts, front and back, could be discarded. A steering gear and a few rods could come off the front. But the rear has some complicated machinery for going around corners. On a turn, one rear wheel needs more speed. It has farther to travel—like the man on the outside file of a marching column of men. The other wheel needs less speed; it has to slow down on a turn—like the man on the inside of a marching column.

So a unit called the differential stands between the two halves of the rear axle and takes charge of the engine speed. When your car is traveling on a straight road, the differential divides the engine speed into two equal parts—one to each rear wheel. When your car turns a corner, the differential divides the engine speed into two unequal parts. The differential takes some speed away from the wheel on the inside of the turn, and gives it to the wheel on the outside. Follow the drawings on the next page and see how the differential works—and how your car turns corners.



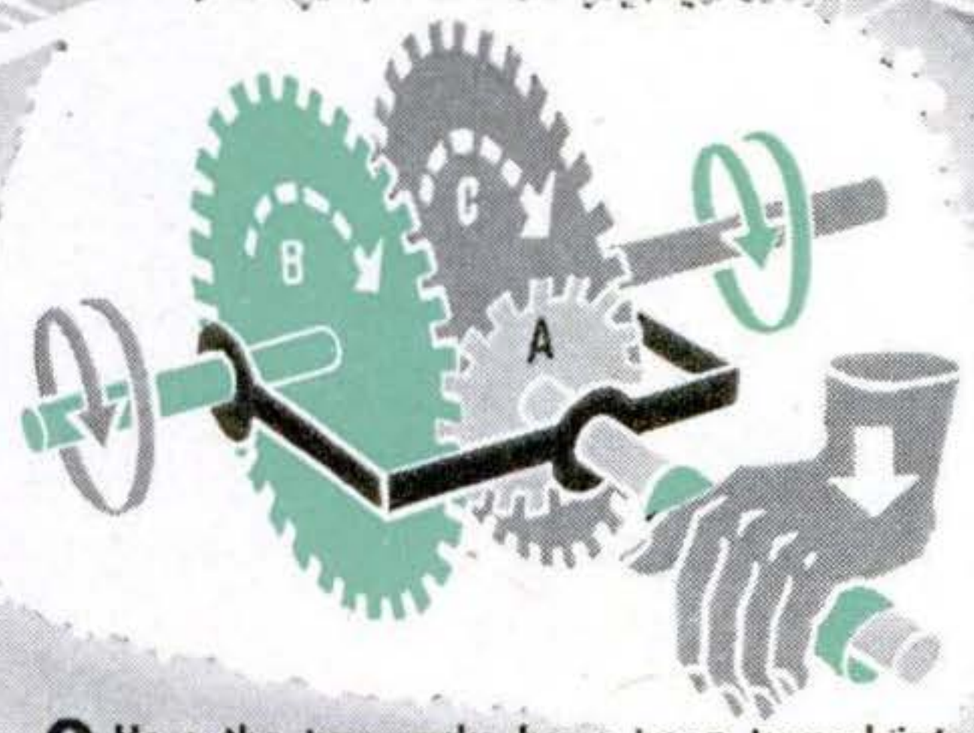

This is how your differential would look if the axle housing were cut away to show the complicated gears.



Copyrighted material

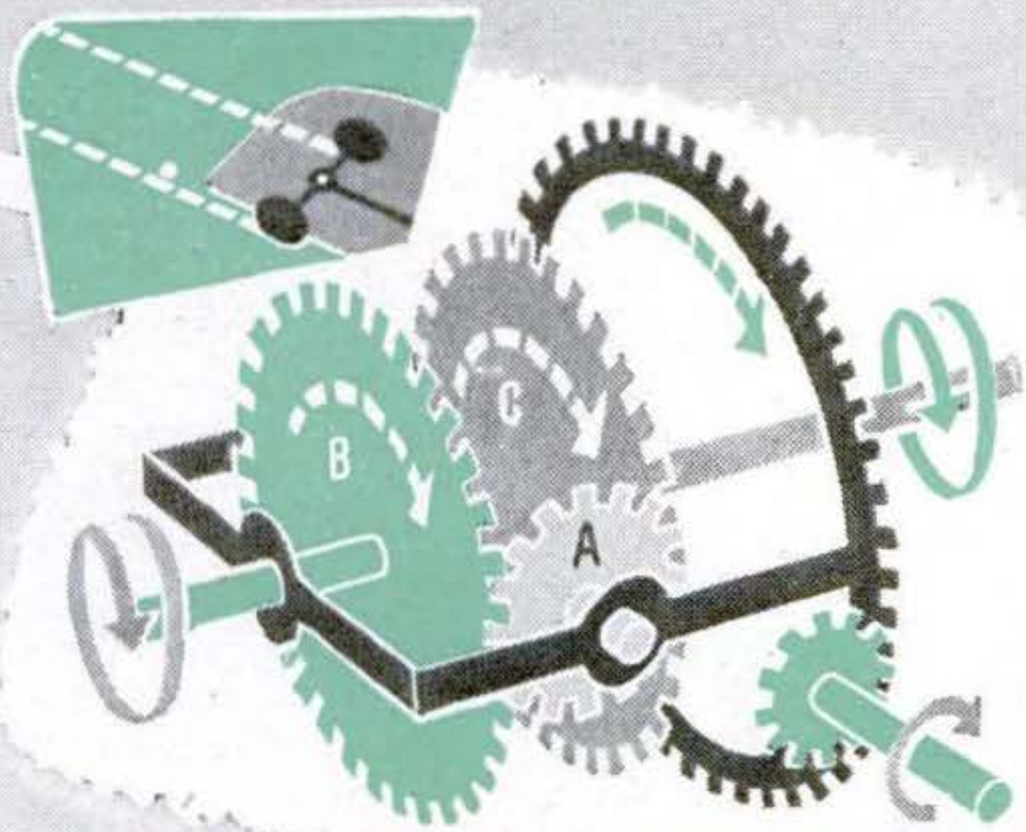
**1** Main parts of a differential work like the pinion A mounted between two racks B and C. All three parts are free to move. As hand pushes down, pinion won't revolve, but pulls racks down with it.

**2** When the hand holds back slightly on rack B and the pinion is pushed down, the free rack C will be depressed by the pinion. But the rack B that's held will start the pinion rotating, moving rack C faster.




**3** Here the two racks have been turned into round gears, B and C, more like the actual differential. Pinion is still mounted between the gears, and acts the same way. As the hand pushes on pinion A, it won't revolve but pulls both gears down and around.

**4** Slow down one round gear, the same way the hand held back on rack B in 2. Now when the pinion is pushed down, it starts to rotate. The pinion is pulling the free gear C around, but the rotation gives that gear a boost, and slows down gear B.




**5** Compare this combination of gears with drawing to the left. Instead of a hand, engine power is pushing pinion A down. When your car is going straight ahead, the differential pinions are pulling both gears B and C around, driving the rear wheels.

**6** When making a right-hand turn, the tire on the right wheel pivots and slows down. This slows the round gear B and affects the pinion. It starts to rotate. The rotation gives the gear C a boost and retards gear B. That's how the rear turns corners.

Under construction for three years, the XB-35 was designed so that all external surfaces contribute to lifting it.

# 100-Ton flying wing

## *OUTSTRIPS B-29*

By LEON SHLOSS and ANDREW R. BOONE

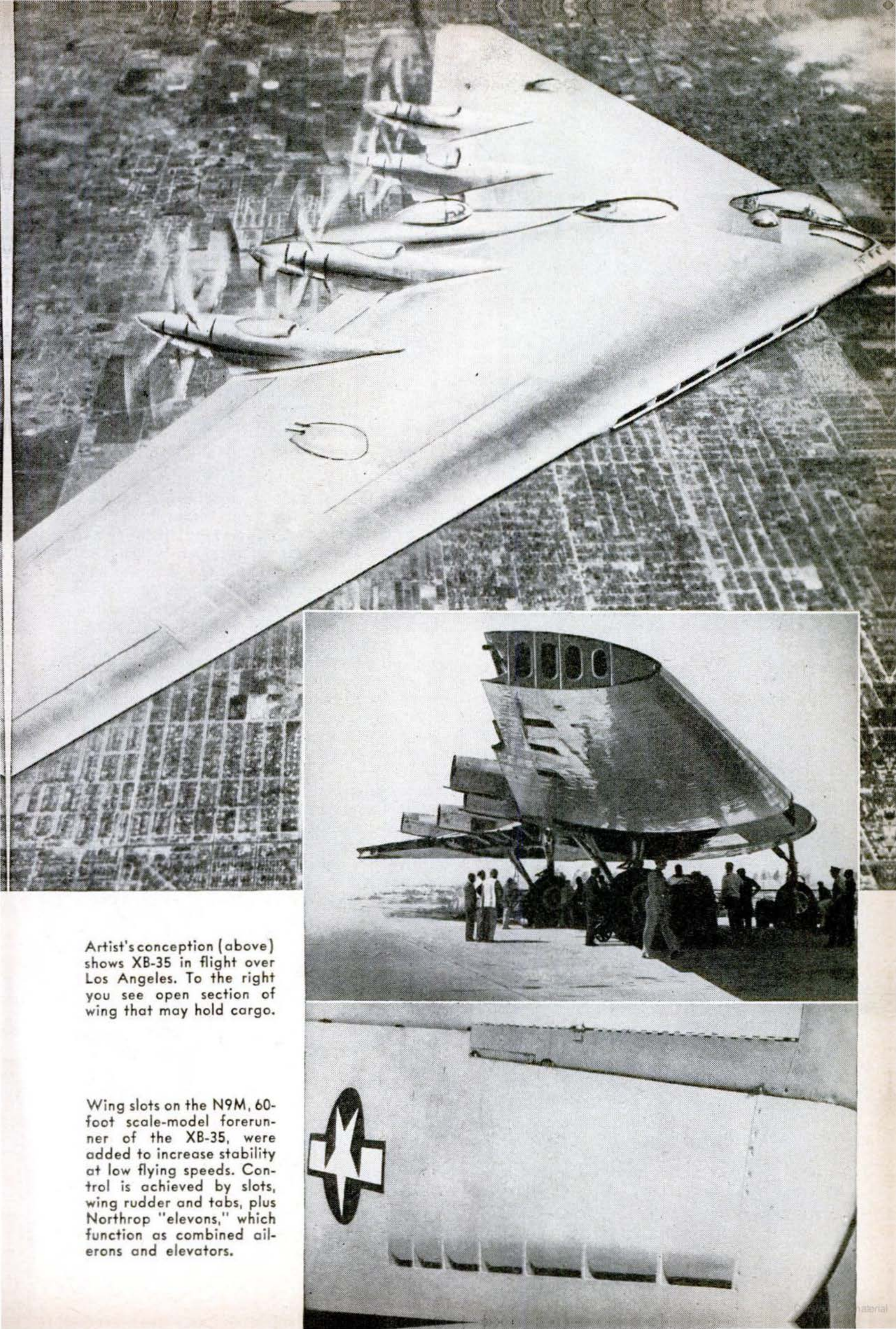
EFFORTS to make tailless aircraft practical began the year before Orville Wright was born. At least 40 pioneers, of nearly as many nationalities, have contributed to the science. Now an American, John K. Northrop, has done it with the Army's XB-35 bomber.

This plane, weighing 89,000 pounds empty, under overload conditions will lift 60 tons of bombs, gas, crew and cargo. The 209,000-pound gross weight is 78,000 pounds more than that of the Boeing B-29 Superfortress. The boomerang-shaped wing is 4,000 square feet in area, more than double the B-29's; hence the great lifting power. Most parasite drag went out with the fuselage, and higher speed came in. The speed figure is undisclosed, but it is known that the plane is expected to outfly the fastest conventional fighters, which approach 500 m.p.h. Four Pratt & Whitney 3,000-hp. engines turn Hamilton Standard coaxial pusher propellers. Fifteen Flying Wings have been ordered, with jet power in prospect for future models. The plane will be shown about the time this story appears. First flight depends on progress of pilots who are preparing to fly the radical giant. Complicating the problem was the death of the outstanding Flying Wing test pilot, and the short, 5,700-foot runway from which the first take-off must be made.

Built by the Northrop Aircraft Co., at

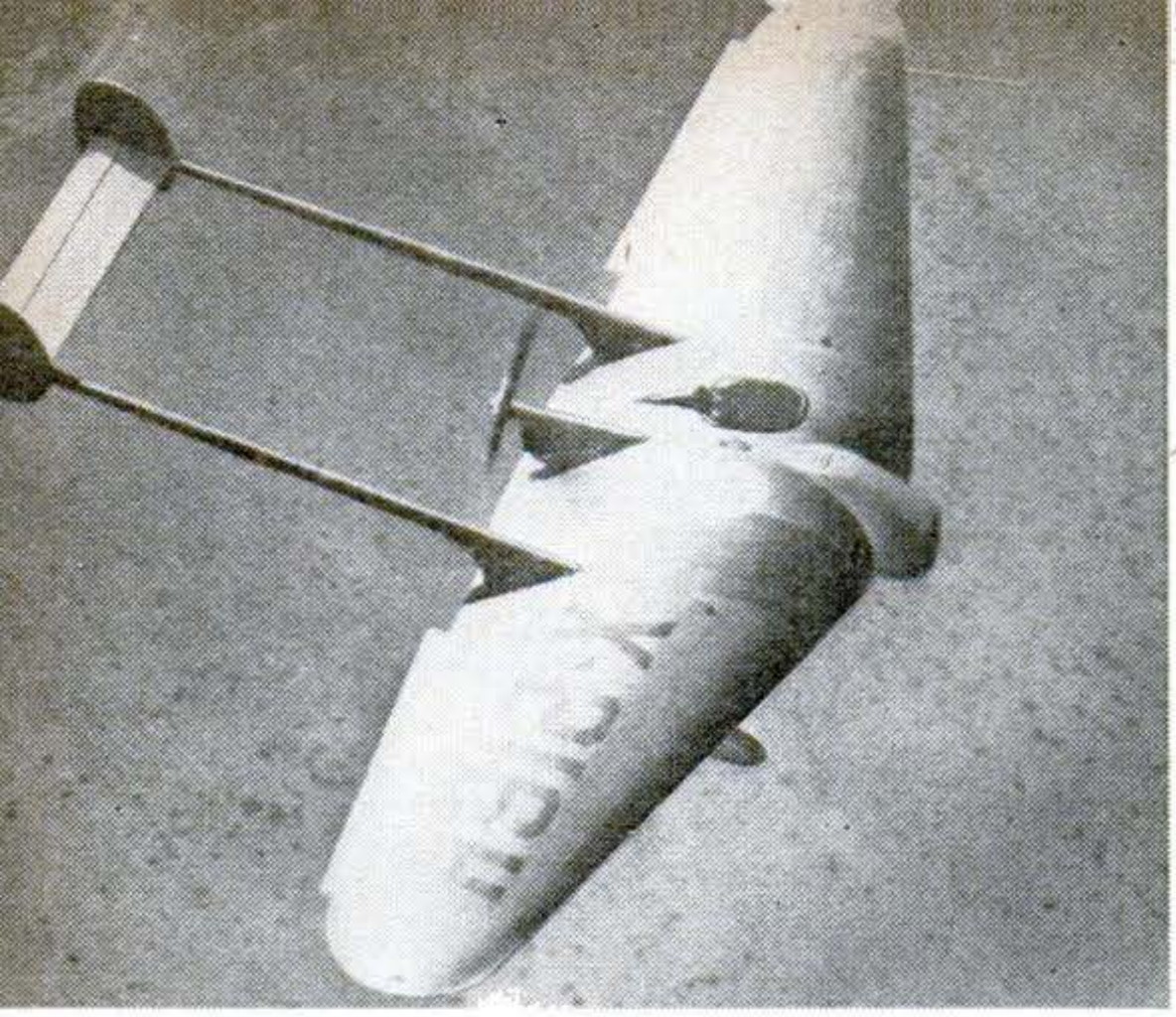


Copyrighted material

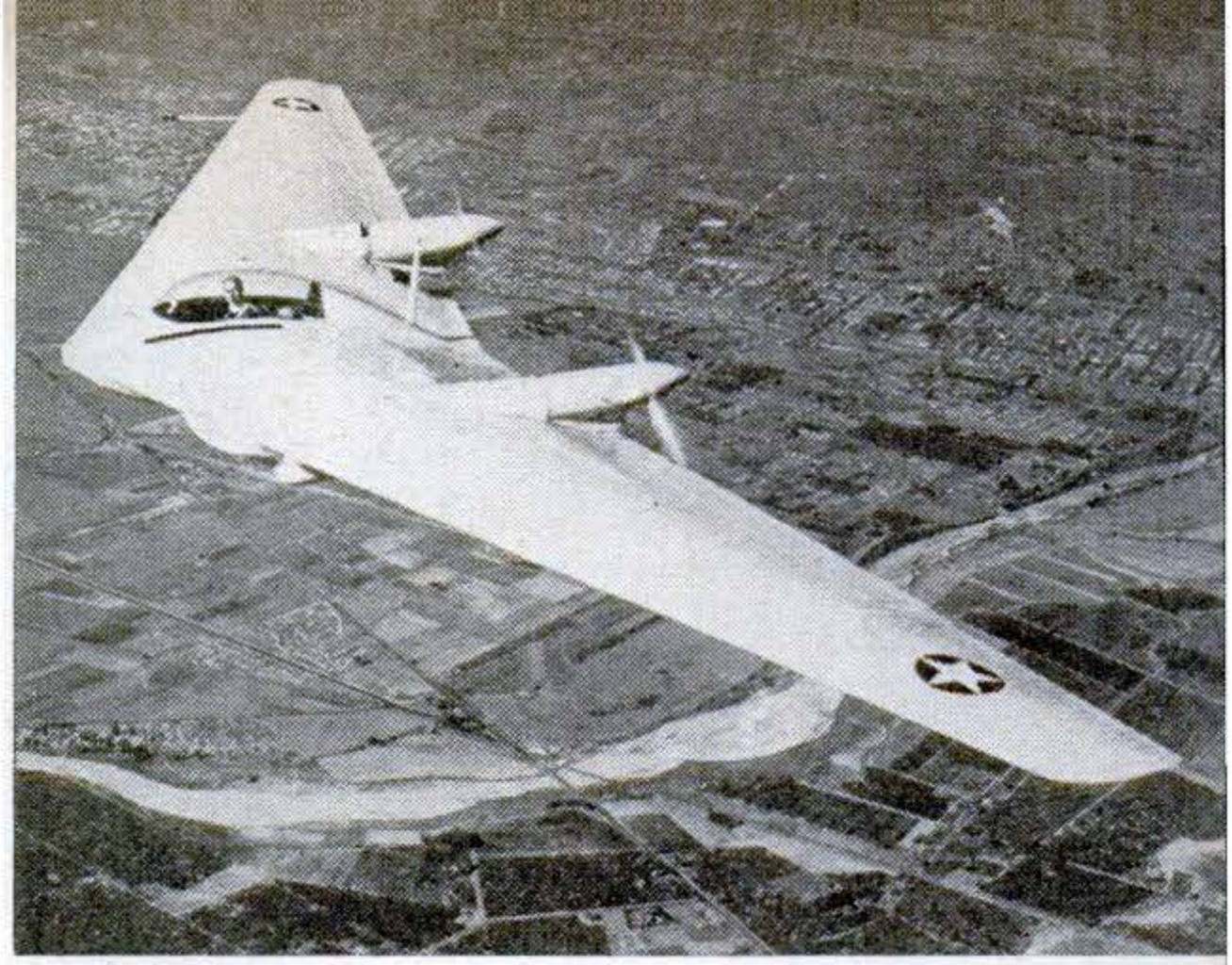


Artist's conception (above) shows XB-35 in flight over Los Angeles. To the right you see open section of wing that may hold cargo.

Wing slots on the N9M, 60-foot scale-model forerunner of the XB-35, were added to increase stability at low flying speeds. Control is achieved by slots, wing rudder and tabs, plus Northrop "elevons," which function as combined ailerons and elevators.



This pseudo Flying Wing of 1929, with 30-ft., 6-in. wing span, contributed a lot of data to the plans of the XB-35.



The N9M was the last of four 60-foot scale models used to predetermine the flight characteristics of the XB-35.

Inglewood, Calif., of a war-developed aluminum alloy—75-S—the XB-35 has a theoretical range of 10,000 miles—from New Orleans to Singapore. Everything is carried within the wings including the engines, excepting gun turrets and a pilot-canopy bubble. All external surfaces contribute to lift. "Elevons" installed in the trailing wing edges combine the functions of elevators and ailerons. Landing flaps, trim flaps and rudders are also in the trailing edges. To move the controls the pilot uses a so-called "feel" system coupled to a full hydraulic boost system. The "feel" applies varying pneumatic forces to the control system at different speeds to hold control movements within safety limits.

Further control is achieved by automatically operated long wing slots paralleling the leading wing edge. These slots assure continued smooth laminar airflow at near-stalling speeds.

Militarily, the XB-35 enjoys the unprecedented advantage of comprehensive fire power aft, thus removing the airplane's greatest combat vulnerability—the hard-to-defend tail. It also presents a smaller target—and can carry the atom bomb, a chore performed heretofore only by the B-29.

Other advantages listed by Northrop will apply to cargo as well as fighting editions: Low drag, high lift allowing transport of any weight faster, farther and cheaper; simple construction; more even distribution of weight; spanwise compartments that accommodate rectangular packing cases more neatly and can be loaded or unloaded more quickly and easily than tubular holds.

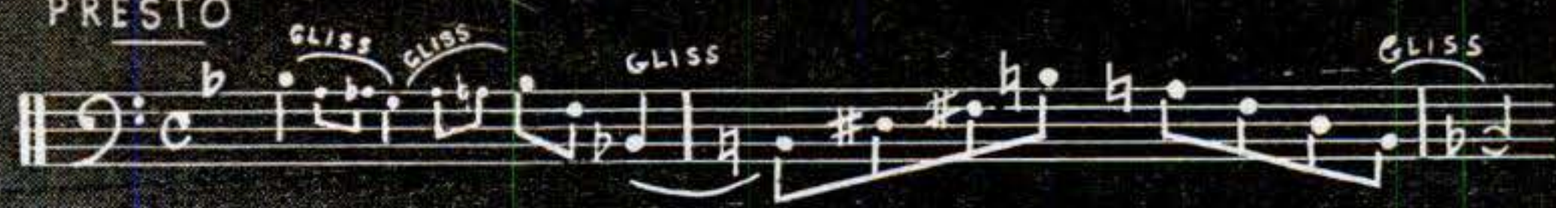
Several foreign designers have built tailless airplanes that flew well, but they encountered engineering obstacles, which Northrop presumably has whipped. There is a transition phase in take-off and landing during which a tailless plane may be hard to control. The biggest engineering hurdle, however, has been the tendency of tailless planes to flat-spin, followed by inability to nose down in order to recover. Until the wing was made thick enough to enclose engines, crew, payload—everything, in fact—there was little aerodynamic justification for such a plane. And a wing that thick meant a plane far larger than could be economically justified. Military need in World War II for mammoth planes, and the current postwar demand for volume and global air transport, brought about a wing large enough to increase chord (depth of wing) to the point where the nose *will* go down.

Another shortcoming was the inability of tailless planes to glide to safety in case of engine failure. This was ironed out along with the original problem when, in the '30s, aircraft engines became so dependable that failures became virtually unknown.

A great obstacle to Flying Wing development has been the timidity of industry to delve into types untraditional and therefore hard to sell. It has usually been the unconservative boss of the small shop who has waded into the lists of radical design. That describes 50-year-old Jack Northrop, who has been designing radical airplanes for 30 years. His first model of the Flying Wing, with a wing span of 30 feet, six inches, had twin booms and a tail, and so was not a true Flying Wing. The first true Wing was flown in 1940, utilizing drooped wing-tip controllers, which Northrop proved successful by experimentation with paper models. This plane was built of wood, easily adaptable to changes in design. General H. H. Arnold, later head of the Army Air Forces, saw this plane fly and ordered developmental work begun on a huge Flying Wing bomber from which grew the XB-35.



Copyrighted material




# REALLY doubling in BRASS

Brad Gowans uses slide and valve simultaneously on his new "valide" trombone.

Close-up of valve assembly (below) shows thumb holding key that locks first valve.

## This Young Man's Horn Does Two Horns' Work

BRAD Gowans cites the musical passage above as one that can be played only on one trombone—the Valide, combination valve and slide instrument that he invented and built. Known to millions as an outstanding "hot" musician, Gowans is not widely renowned for the fine machinist he also is.

Since 1922, Gowans has played the slide trombone, clarinet, cornet, saxophone, drums, piano, ballad horn and valve trombone with 27 groups, including The Original Dixieland Jazz Band. He is now playing the Valide in Eddie Condon's band. On the Valide 28 notes can be played in one position without changing the embouchure (position of the mouth against the mouthpiece) as against seven on any other trombone; it can be used as a slide trombone in seven keys by locking down the valves in different combinations, as a valve trombone in four keys by locking the slide in one of its four positions, as a valide by using both methods at once or one in conjunction with the other. The thumb of the left hand operates the valve lock to add the fifth, sixth and seventh positions to the four-position slide. The middle finger of the left hand holds the slide and tunes the valves when the right hand is being used on the valves. The right hand operates both valves and slide. Where fast changes are involved the thumb and little finger control the slide while the second, third and fourth fingers work the valves.

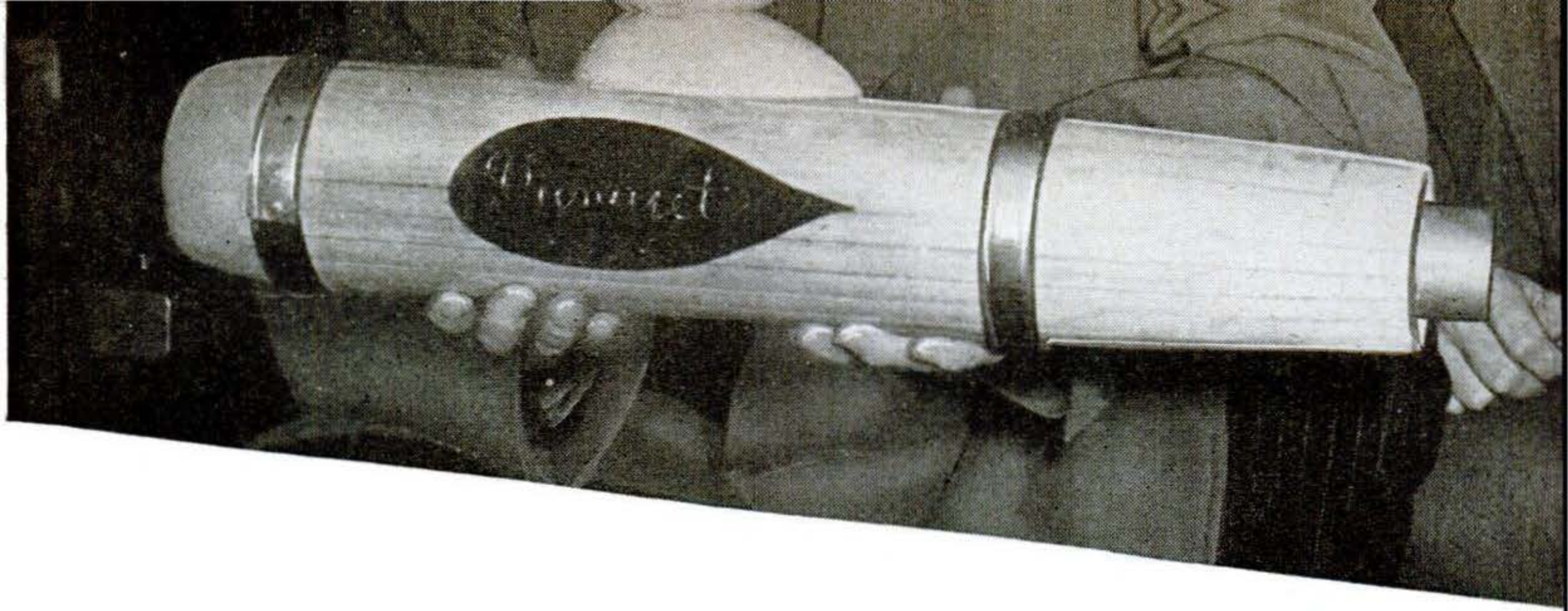
Other advantages: Valve assembly is moved up close to mouthpiece, relieving player's arms of much weight; short slide avoids danger of smashing slide into some obstacle; many arpeggios impossible of execution on slide trombone can be played; chromatic passages can be played faster; glissando is easier of execution; embouchure is not disturbed when slide is fully extended.

Gowans will not market the instrument, at least not until he finishes a new contract recording for Victor with his own band.

This Young Man (Really) With A Horn also recently perfected a realistic parlor baseball game after 25 years' work. Right now he is installing a 91-cubic-inch, 8-cylinder racing engine in a British Standard Swallow. After he finishes playing with Condon at 4 a.m., that is.



Copyrighted material



# BABY V-1 Flies for Fun

## Tiny jet built to power models drives toy car 150 miles an hour

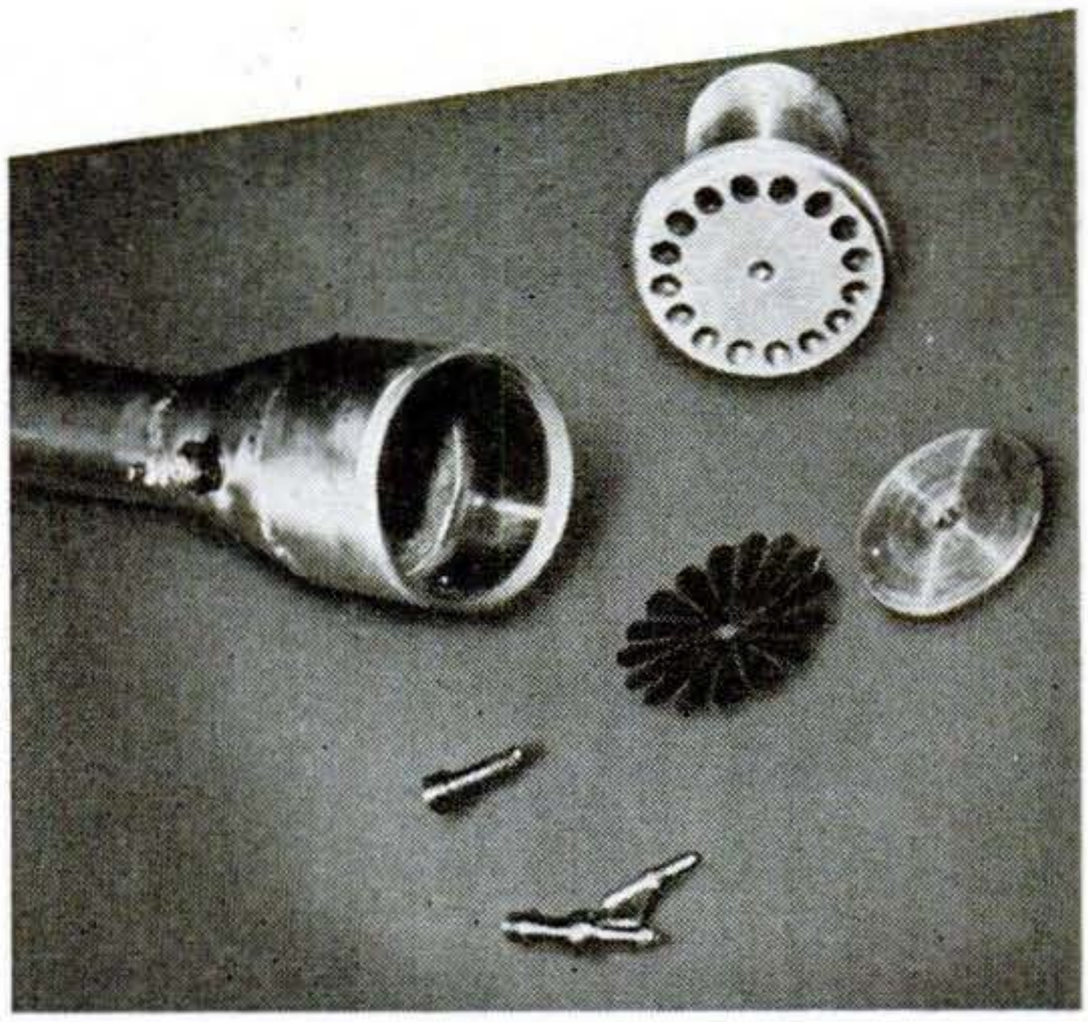
THE same kind of a pulse-jet engine that poured winged bombs—V-1s—on England in 1944 has now been reproduced in miniature to power model airplanes, automobiles and boats. The inventors, William L. Tenney and Charles Marks of Minneapolis, have shrunk the Nazi engine to toy size. For its measurements, it probably is the most powerful package of energy ever produced. It will drive a miniature automobile, for example, 150 miles an hour.

The 12-foot Nazi jet produced a "thrust" of 600 pounds. The 21-inch baby jet supplies a thrust of three pounds when not moving, more than that when movement rams air through the spring shutters in its nose. Tenney states that his company, Aeromarine, can go the Nazis one better by producing from 600 to 800 pounds of thrust with an engine less than three feet long and 16 inches in diameter. The V-1 power unit was 22 inches in diameter.

In larger sizes, the inventor believes, this "Dyna-jet" could be used to drive full-scale airplanes, racing cars and boats. He foresees its use as a "life preserver of the air," supplying power for air transports in case of engine failure. It could also, he says, afford extra bursts of speed for fighter planes and for the take-off of heavy planes.

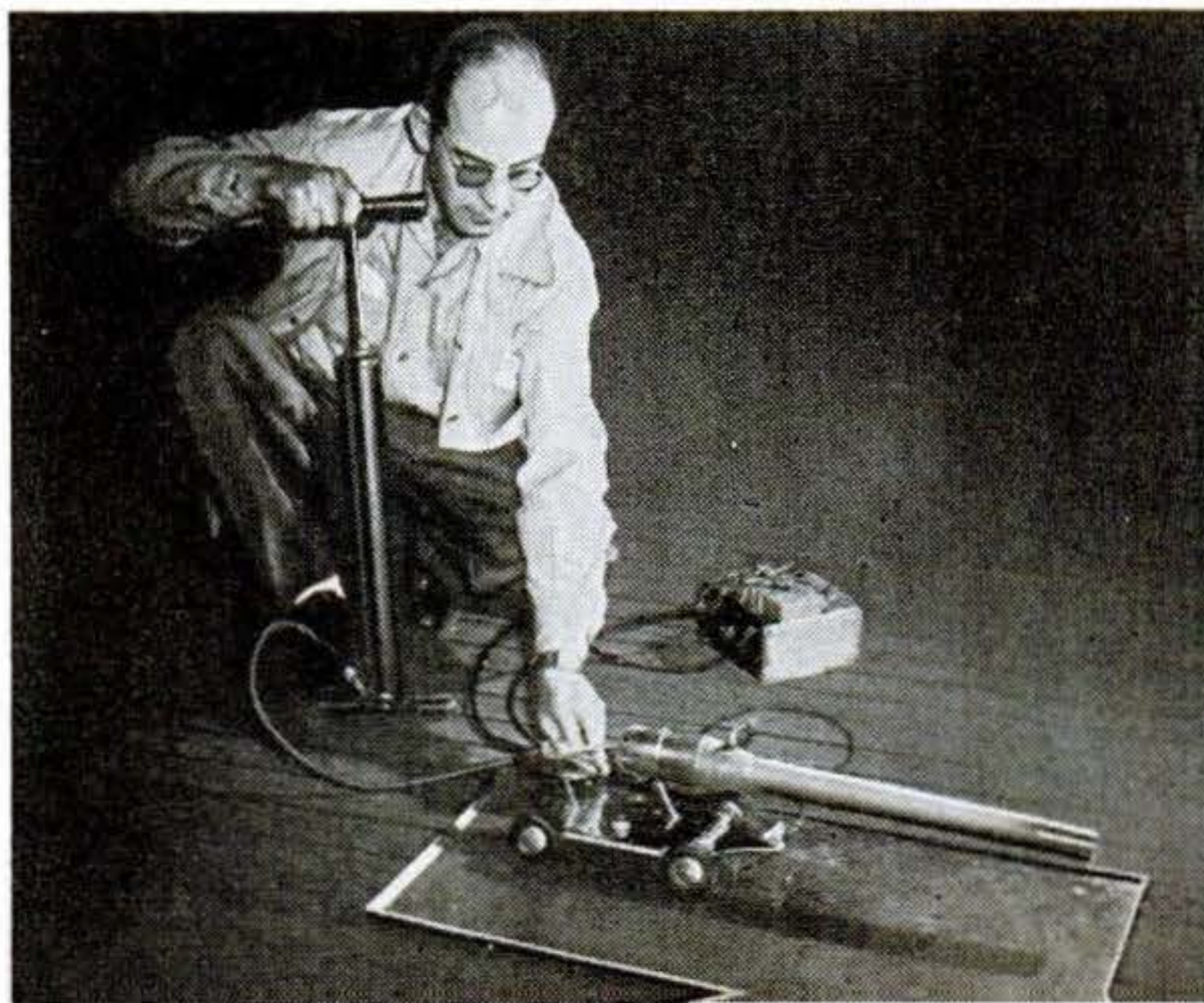
Like the original jet on the robomb, the "Dyna-jet" is economical of parts. And only one of them—the shutters that alternately receive and shut off the entrance of air in the combustion chamber—moves. The entire assembly weighs only a pound. Its fuel is gasoline, kerosene or stove oil.

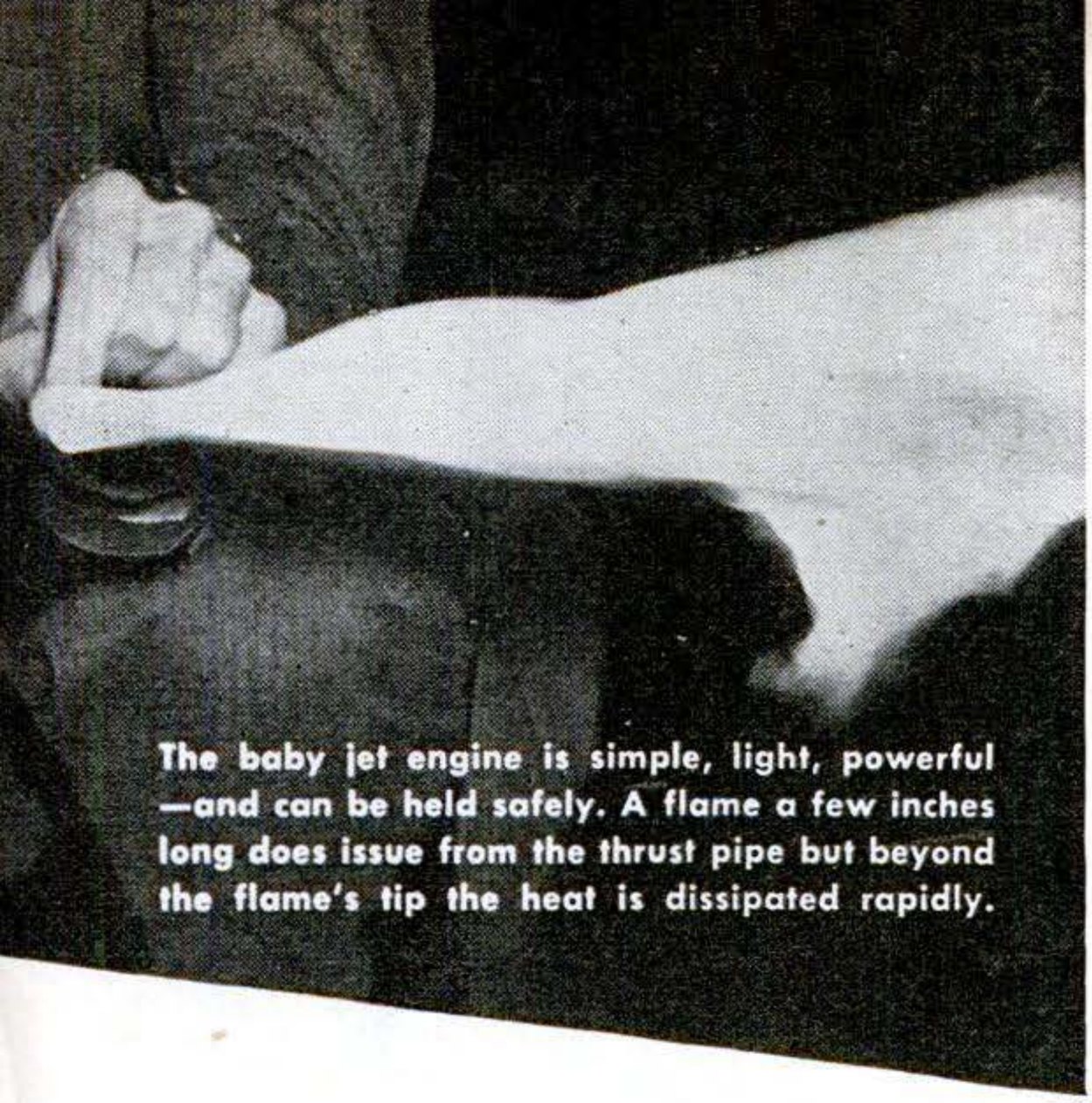
Like the big jet, it uses compressed air,



The "Dyna-jet" tube holds only six parts, made of stainless and spring steels and aluminum.

A bicycle pump supplies the tiny jet, mounted on a toy car, with compressed air for starting.



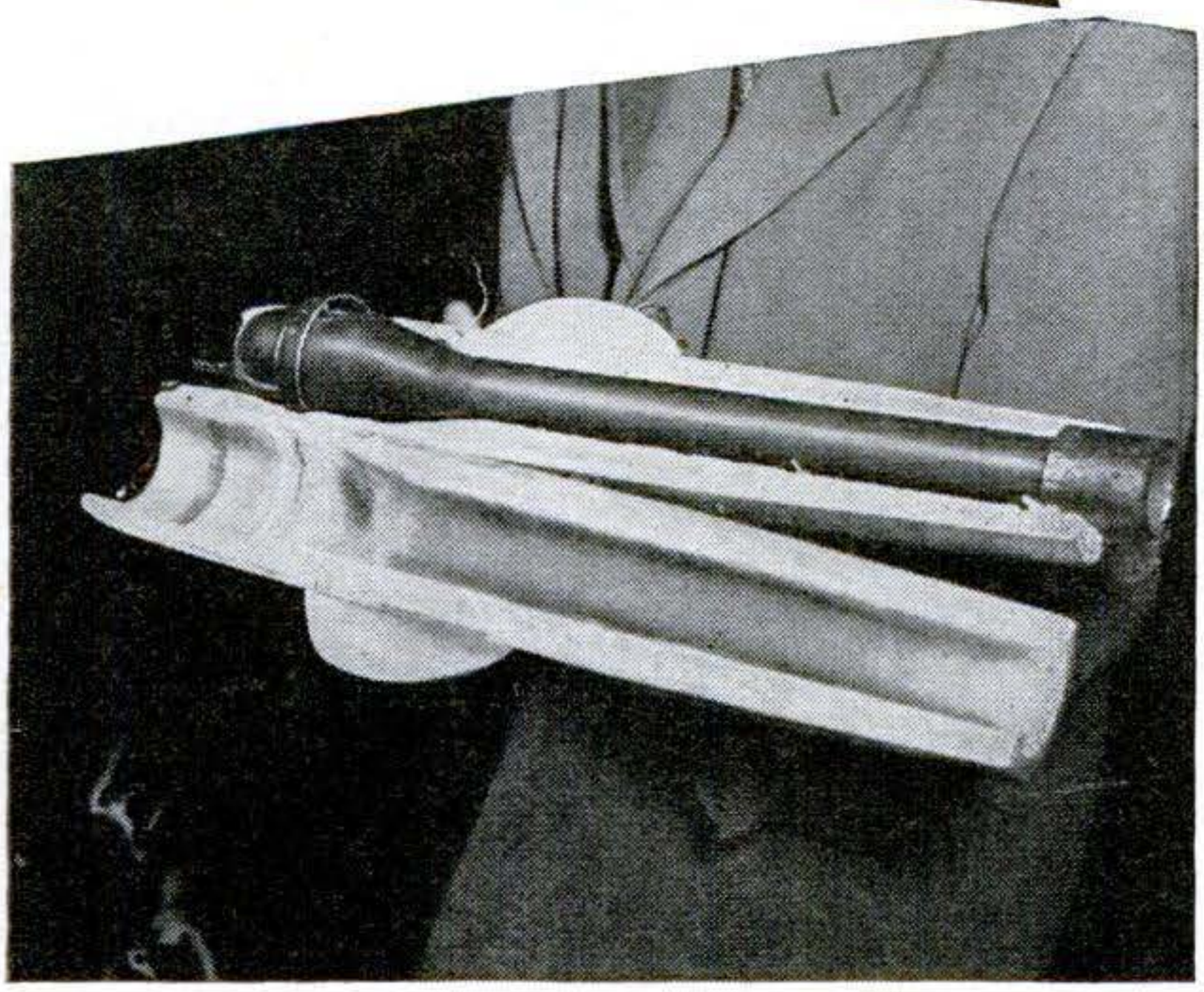


The baby jet engine is simple, light, powerful —and can be held safely. A flame a few inches long does issue from the thrust pipe but beyond the flame's tip the heat is dissipated rapidly.

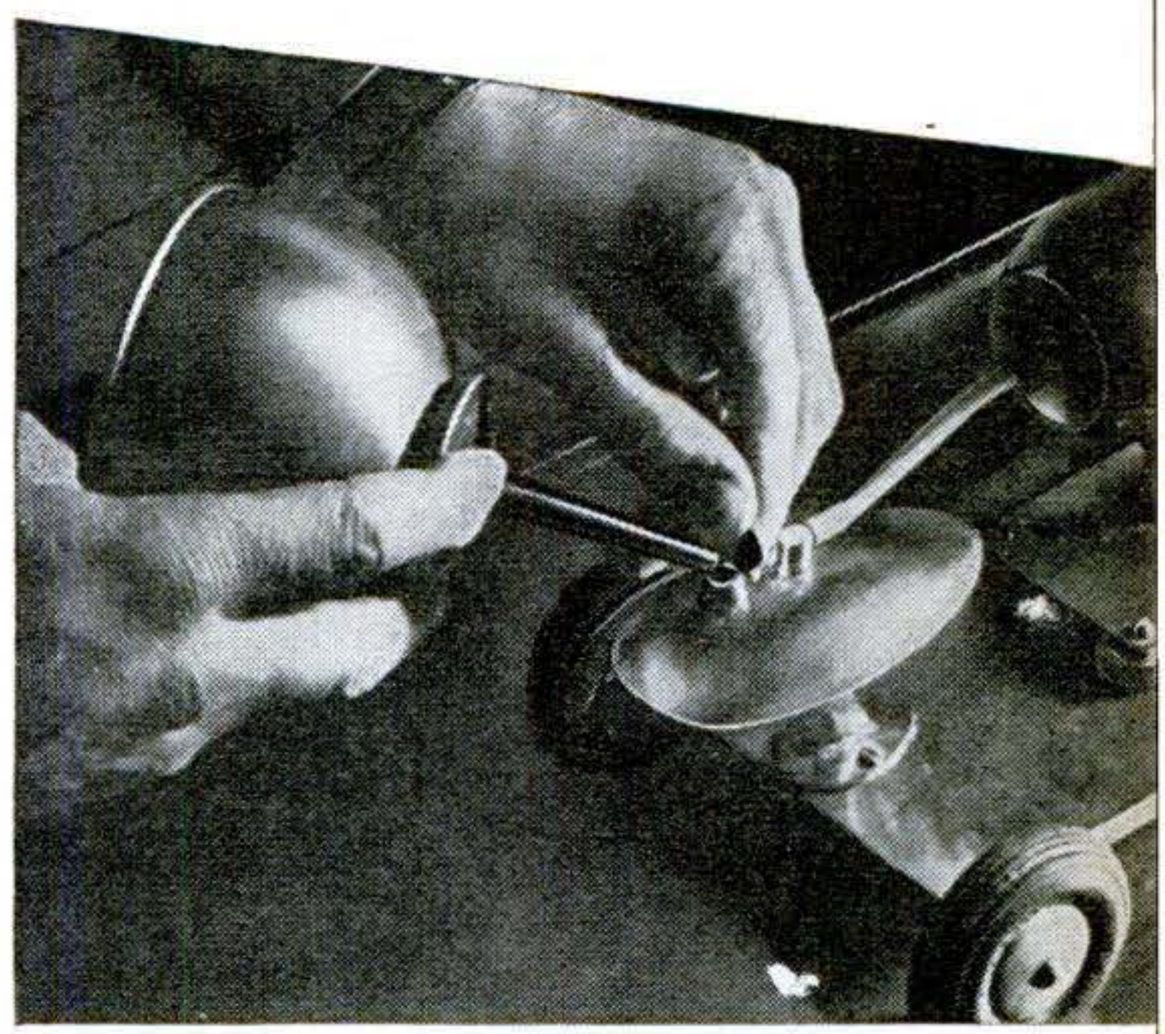
but for a different reason. The robomb contained two cylindrical bottles of compressed air to drive three gyroscopes that governed its flight. The "Dyna-jet" uses compressed air to provide a combustible mixture in the firing chamber to start the engine. Both jet engines use a spark plug for ignition.

There is another marked difference between the two engines. The robomb's engine pulsed at a rate of about 45 times a second. The baby jet pulses up to 250 times a second.

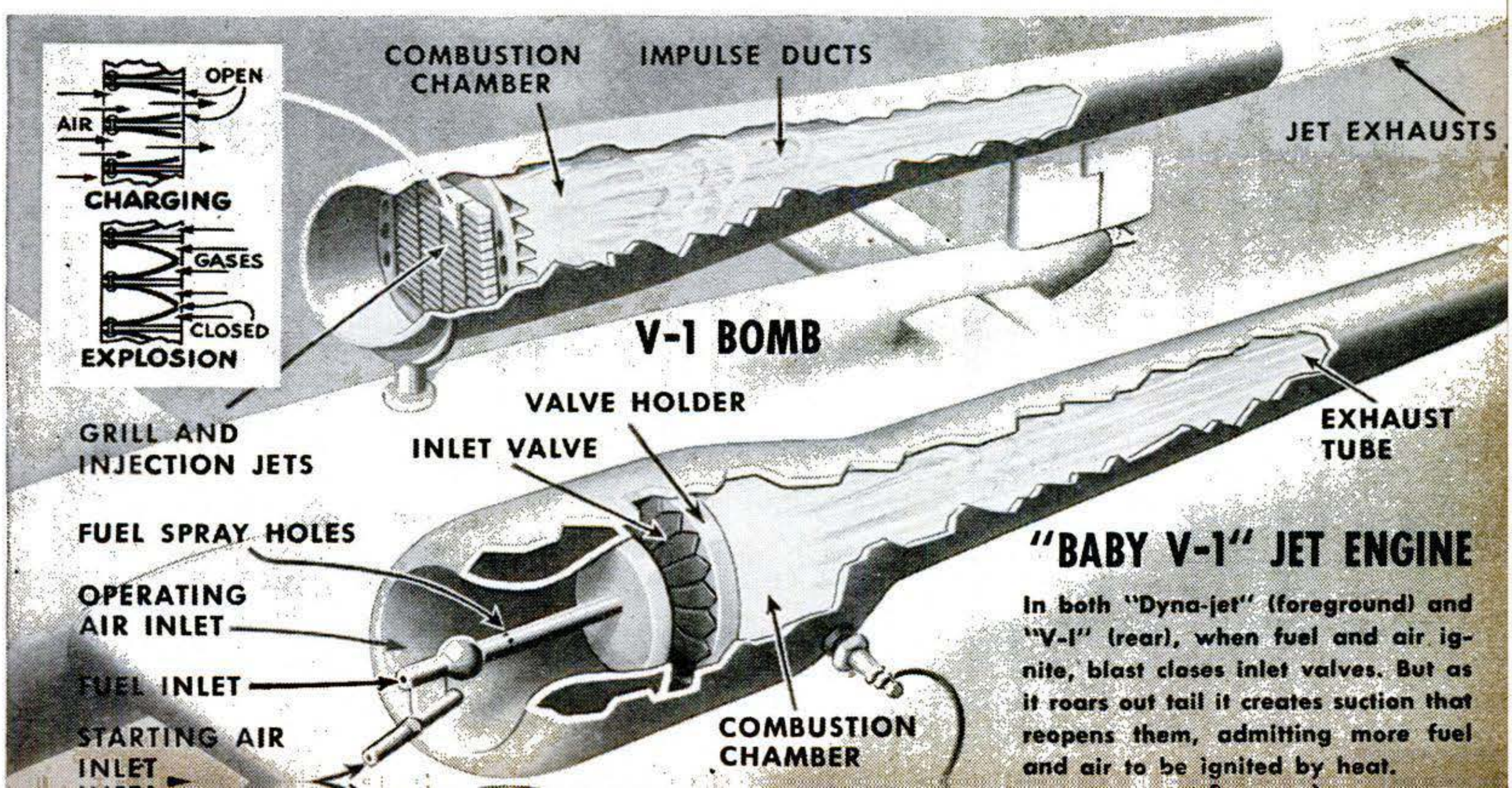
It was test flown in Dayton, Ohio, in March, but prior to that had driven miniature racing cars and boats.



Inventors Tenney and Marks confounded their critics, who predicted the jet engine would burn fingers and ignite model planes and boats, by wrapping it in balsa wood.



The "Dyna-jet" consumes fuel, from a household oil can, at the rate of two to three ounces a minute; operates from 12 to 15 seconds on it.




## "BABY V-1" JET ENGINE

In both "Dyna-jet" (foreground) and "V-1" (rear), when fuel and air ignite, blast closes inlet valves. But as it roars out tail it creates suction that reopens them, admitting more fuel and air to be ignited by heat.

TAXI SERVICE

VACATION TRAVEL

CROP DUSTING

FOR SUCH VARIED JOBS AS THESE

# Heli-taxis are here

By DEVON FRANCIS*

A MAN wrote to the Bell Aircraft Corp., Buffalo, N. Y., helicopter manufacturers, the other day and inquired, please could he buy a helicopter to go on a hunting expedition to Africa and wound an elephant? He didn't want to *kill* an elephant, he just wanted to wound it with rifle fire. He had heard that dying elephants all plodded off to a secret place to expire. In his helicopter he would follow the wounded elephant and turn up a fortune in ivory.

Another man asked if he could buy a helicopter, put an orchestra in it, and have it hover over the floor of his dance hall.

An undertaker wanted a Sikorsky helicopter to waft the mortal remains of his customers to their final resting place.

The manufacturers did not smile charitably behind their palms. Helicopters could do all those things. Of all the transportation vehicles engineered since the beginning of time, the helicopter is the most versatile.

And commercial helicopters are here. Deliveries will start next month. All that a person needs to buy one is enough money and a priority from a manufacturer.

Today's American helicopters were born just before the war and refined by use in the Burma jungle and on China's high plateaus. They flew in weather that grounded every other kind of aircraft. From boats standing off Pacific islands, they toted repair parts for Superfortresses to new landing strips. They plucked mariners from ocean swells. The crew of one helicopter, cruising over Alaska's wastelands, shot one of several wolves that had cornered a caribou.

In the next few months helicopters will be cruising over cities and towns and open country on dozens of kinds of errands. They will be used for short-range travel by business executives, for patrolling pipe lines, and even for taxis. Crop-dusting by helicopter will be commonplace. Hundreds of heli-

*Associate Editor, PSM, and author of "The Story of the Helicopter," published this month by Coward-McCann, $3.

Drawings by T. MADAWICK

TORQUE CORRECTION BY TAIL ROTOR

Sikorsky 4-place transport has top speed of 103 m.p.h. at sea level; will cruise 150 miles.

SIDE-BY-SIDE INTERMESHING

Copyrighted material

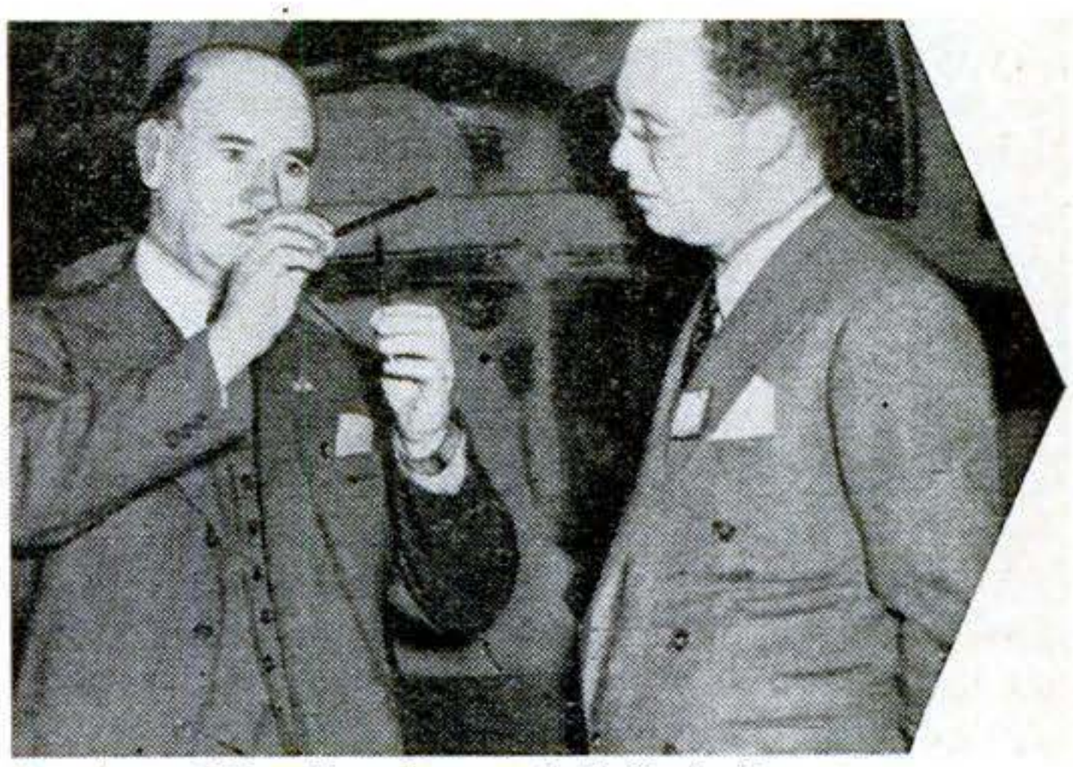
INTERURBAN TRANSPORT

EXECUTIVE TRAVEL

COMMERCIAL FISH SPOTTING

## HELICOPTERS ARE IDEAL

# Manufacturers Are Forging Ahead with Machines that Stand Still in the Air.



Dr. Igor Sikorsky, dean of U. S. helicopter makers, converses with PSM's Devon Francis.

copters will soon be produced, but *they are not yet vehicles for private customers.*

Helicopters for commercial uses will precede those for private use for several reasons. They are still too expensive to buy and maintain, they are still comparatively inefficient (they won't go very far on a gallon of gas), they are still hard to fly; and, finally, the manufacturers don't want their product to fall into "unsympathetic" hands.

The manufacturers know that their product, potentially, can be sold in the millions to the public. If it is carelessly used and serviced at this stage of the game—if helicopters are involved in some bad accidents—the future market may be badly affected. If, on the other hand, hundreds or thousands of helicopters are proved out by hand-picked customers, tomorrow's market will be gratifying. Those hand-picked customers will be business houses and government agencies.

Helicopters are expensive, first, because they are being made in small quantities. Only mass production brings unit savings. Bell, for instance, will produce only 500 two-passenger machines as a beginning. These have been sold in advance. Helicopters are expensive, second, because the manufacturers are writing off at least part of their research and engineering costs on the first batches they turn out. They are expensive, finally, because as yet they are too complicated mechanically. One of the reasons for this complexity is troublesome torque, the tendency of the helicopter to twist in a direction opposite to that in which the blades whirl when power is applied.

Laymen insist on comparing helicopters

COAXIAL

Bell 2-place helicopter, with cruising speed of 80 m.p.h., carries more than normal load of one-fourth gross weight.

JET-PROPELLED

Copyrighted material

BORDER PATROL

AIR-SEA RESCUE

PACKAGE DELIVERY

## FOR SUCH VARIED JOBS AS THESE

to airplanes and automobiles. A two-seated helicopter requires almost three times the power of a two-seated small airplane and is 20 miles an hour slower. The power required to run a two-seated helicopter would drive an eight-ton truck. But such contrasts make the helicopter people sore.

They say, first of all, that a helicopter cruises on half or less of its horsepower. It is highly powered to permit straight up-and-down flight. They say that neither an automobile nor an airplane will do what a helicopter will do. That is certainly true.

They say a small helicopter will use no more fuel than an automobile if each travels 80 miles an hour. That is also true.

They say an 80-mile-an-hour helicopter is far faster than an automobile and faster door-to-door than a 200-mile-an-hour airplane for distances up to perhaps 300 miles. That is true—if the helicopter can take off from the middle of town and land in the middle of the town it is going to while an airplane pilot is getting to and from airports.

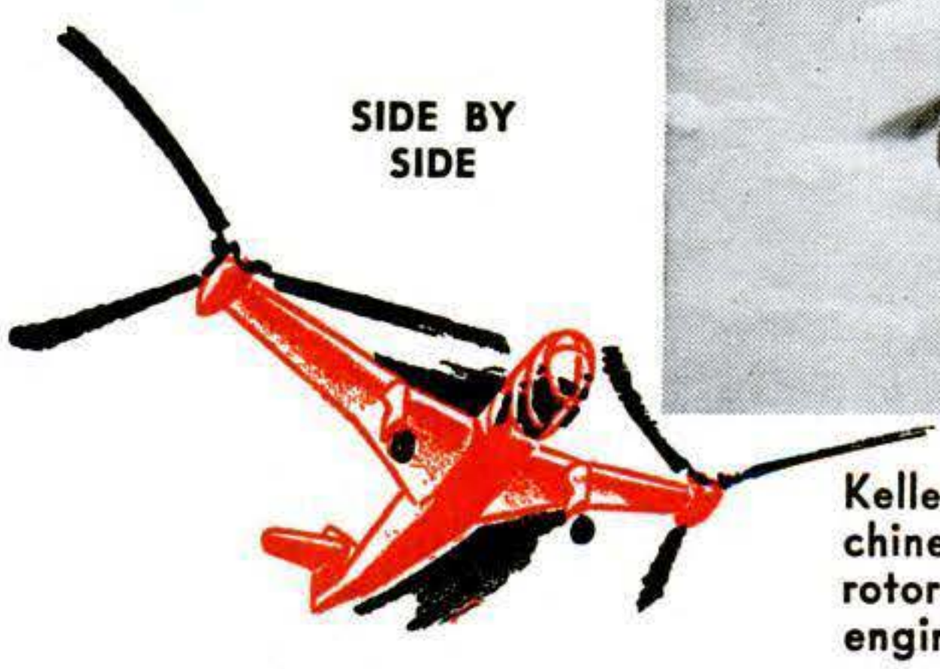
They say that whereas an automobile must wind around tortuous curves and stop for red lights, a helicopter travels in a straight line at a constant speed. That is true. They say, too, that helicopters can fly in weather that immobilizes airplane and automobile travel. And that is true.

But they do not emphasize that the things are hard to fly. A helicopter has four controls, against three in an airplane. It demands strict attention. Yet the helicopter people say any normal person can be taught the rudiments of helicopter flying in eight hours of instruction. And helicopters are going to be easier to fly. A few of them are being equipped with a brand new gadget, a governor to draw from the engine the exact amount of power required by the pitch of the rotor blades. This has previously been the pilot's tricky problem. Of course, there is a catch—the governor costs no less than $800. But other simplifications will follow, just as clash-free gears and four-wheel brakes came to the automobile.

For six weeks, winter before last, Floyd W. Carlson, chief helicopter test pilot for the Bell company, flew a helicopter home every night and to work every morning. He landed in his front yard and left the machine parked out in the weather. He didn't miss a day despite sleet, rain and snow. That seemed to dispose of the theory that under icing conditions a man who took a helicopter aloft was a candidate for slow music and flowers.

One company figures that any airport-to-post office mail run that takes a truck 30 minutes can be negotiated by a shuttle helicopter in a maximum of five minutes.

Sikorsky's helicopters capped a series of extraordinary performances in the war with peacetime records. One of the big ones built for the Army carried 18 persons a



SIDE BY SIDE

Kellett XR-8, Army machine, has intermeshing rotors. Its 245-hp. Franklin engine is behind pilot.

TORQUE CORRECTION BY JET



Copyrighted material

EMERGENCY TRANSPORT

WIRE LAYING

AIRPORT-POST OFFICE SHUTTLE

## HELICOPTERS ARE IDEAL

short distance off the ground. It also flew to a height of more than 21,000 feet and made 114.6 miles an hour in level flight.

Problems in helicopter design remain. A helicopter does things that baffle even the best of the engineers. That is understandable. Less than a quarter of one percent of the engineering spent on perfecting the airplane has been expended on the helicopter. It is about where the automobile was in 1905. It must develop not only greater efficiency but also more speed, more stability —the kind that permits a motorist to take his hands off the wheel momentarily at 50 miles an hour—and less vibration.

Efficiency is improving. The earliest helicopters barely were able to stagger off the ground. Today's carry a "disposable load"—fuel, passengers and baggage—of a fourth of their gross weight. The disposable load of an airplane varies from a third to nearly a half of the gross weight.

Stability is improving. By using a stabilizing bar working on the gyroscopic principle, plus a two-bladed "teeter-totter" rotor that obviates flap hinges at the blade roots, Bell has proved that stability can be increased and vibration decreased.

The assorted rotor combinations being used by the 51 U. S. companies and individuals making helicopters or experimenting with them show (in drawings at bottom of pages 84-87) that the designers are wallowing in a sea of undigested research. They know they must simplify the rotor systems to cut cost and make servicing easier. They know they are not getting enough lift out of their blades. They know that jet-propelled blades would solve many of their problems at one fell swoop. Jet propulsion, whirling a rotor just as water whirls a lawn sprinkler, automatically would dispose of torque. Torque does not develop unless power is applied directly to the rotor. But jet reaction applied to helicopters is exceptionally wasteful of power.

What the helicopter people would like most to know right now is what rules are going to govern helicopter flight. If helicopters are forbidden to land in midtown, their usefulness will be cut in half. That's where helicopters shine—doing things that airplanes can't.

Pilot Carlson of the Bell company gave me a ride in the first and, as yet, only helicopter commercially licensed by the federal government. It is a two-place job with a 175-horsepower engine that cruises at 80 miles an hour. Once off the ground, I could understand why helicopter people get wacky over their machines.

We sat in a comfortable cockpit like that of a small airplane except that a plastic bubble took the place of fabric and metal. It contained one additional control, that for rotor blade pitch. Carlson nudged the throttle open. We went faster, straight up, than the world's fastest express elevator.

LONGITUDINAL

One-place "Roteron's" 25-hp. motor is mounted between coaxial rotors.

LONGITUDINAL INTERMESHING

Copyrighted material

PIPE-LINE PATROL

POWER-LINE MAINTENANCE

One moment the ground was a couple of feet below. Seconds later it was hundreds of feet below.

Forward flight was like that in an airplane. Certainly there was no more vibration than there is in an airplane. Possibly there was less. But I did notice an odd, modified gallop. It felt like an automobile on a washboard road.

"That's not normal," explained Carlson. "The blades need adjusting. You get that when one blade doesn't 'track' in the path of the other one."

The helicopter gained and lost altitude and speed at his will. Though an extremely strong wind was blowing, we felt no air bumps. The whirling canopy of blades above us smoothed them out. We came around for a landing quite high and very fast, and of a sudden we were just hanging there in space. Carlson had gone from 60 to 0 miles an hour in a twinkling. A helicopter can stop twice as short as an automobile.

"This is an autorotative landing," he said. He throttled back. The rotor, freed of the engine through an over-running clutch, spun on its own as our descent produced a rush of air against the blades. We had gone up like an elevator, and now we came down like one. The helicopter glided like a streamlined brick. Then, just off the ground, Carlson hauled back on the stick. The blades cushioned the fall and the wheels touched as light as eiderdown at a forward speed that could have been no faster than a walk.

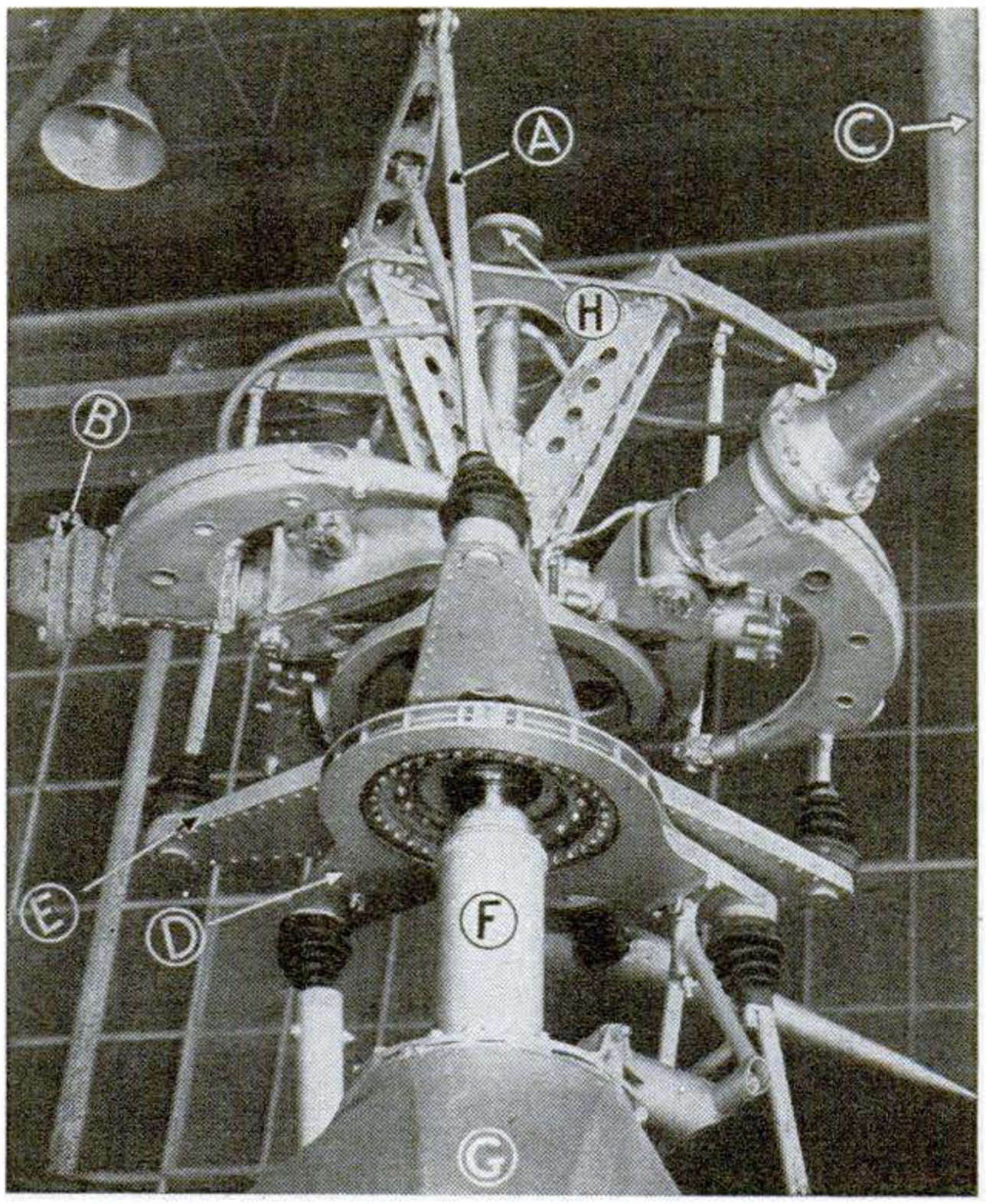
For fun, Carlson took off again, backed up a few feet and landed with engine power.

One of the company employees, who has been watching the helicopters fly for years, was waiting for me as I climbed out. "That was wonderful," I said, "and now let's go get a beer."

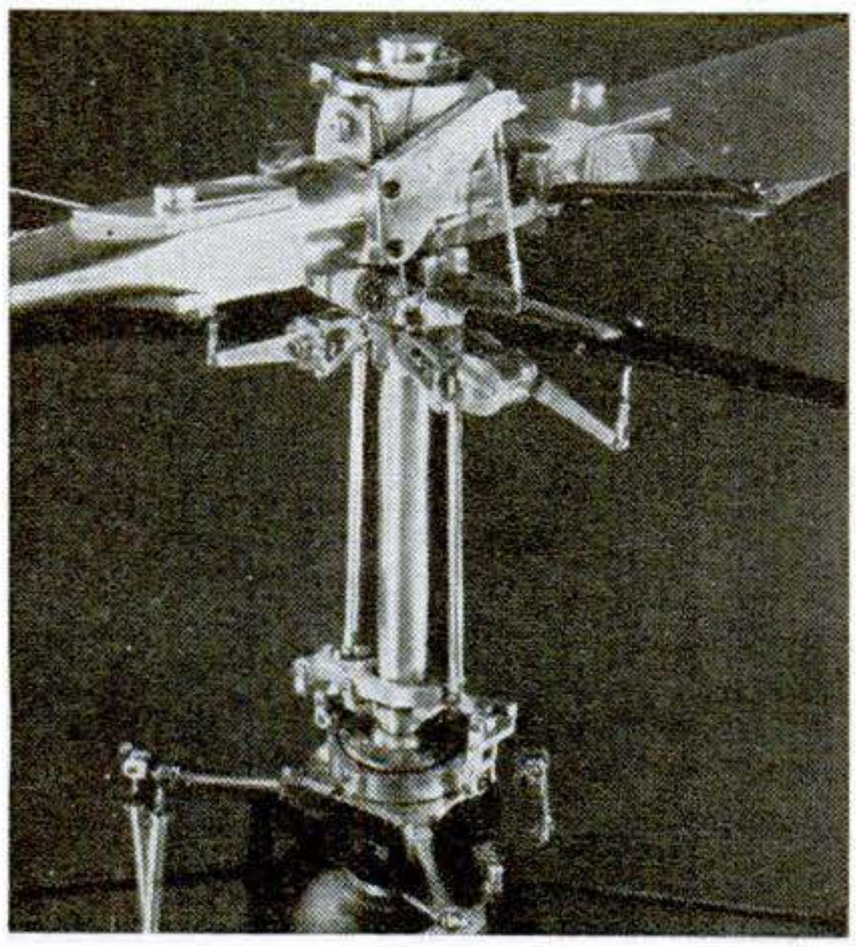
"Do you mind waiting a minute?" he replied. "I want to see the ship make one more hop."

That's the way helicopter people are.

Sikorsky rotor head (at right) consists of (A) pitch-control levers, (B) cuff or blade attachment, (C) blade, (D) "wobble plate," (E) cyclical pitch control, (F) main rotor shaft, (G) supporting pylon, and (H) hydraulic fluid.

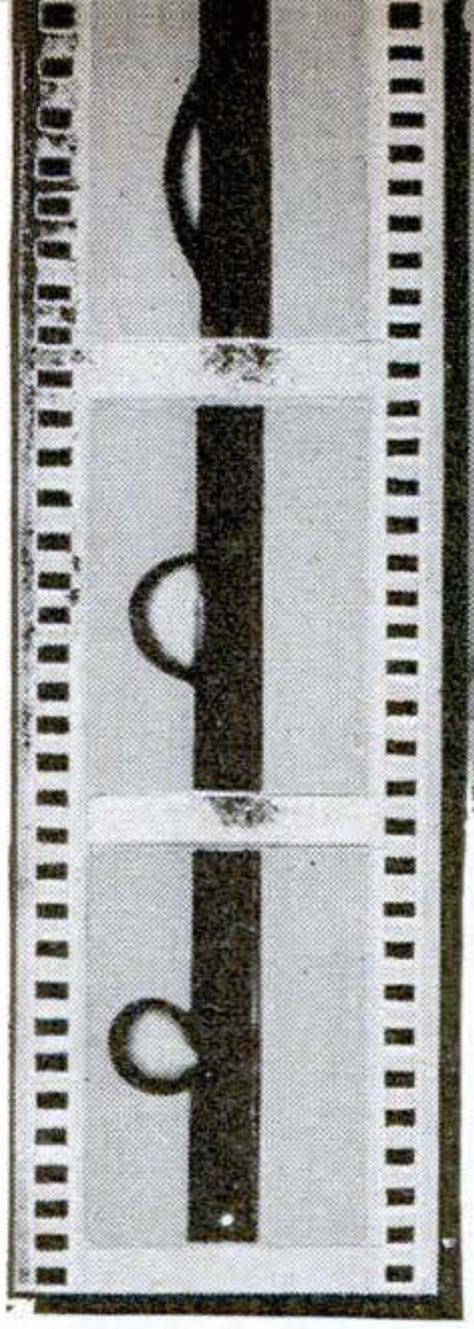



Bell rotor head uses "cyclic pitch" but also incorporates special stabilizing device.





Copyrighted material



# Clean Hair

## *Assured by Microscope Movies*

### First Films of Hair Washing Show Chemical's Action

THE average human head supports 130,000 hairs. Every time the world washes its head, approximately 286,000,000,000,000 hairs are scrubbed. But only recently has anyone made a moving picture of a single hair being washed. Those pictures indicate that the most efficient shampoo is an alkyl-sulphate solution. Alkyl sulphate is made by reducing fatty acids by catalytic hydrogenation under high pressure and treating the product with sulphuric acid.

The movie, produced by Procter and Gamble Co., was made by focusing a microscope on a single hair and then taking moving pictures through the microscope. It shows (above) how alkyl sulphate picks up a bubble of dirt and oil and floats it away. When soap was used, it combined with natural water salts and formed an insoluble lime deposit in which some of the dirt and oil were incorporated. A sticky blob of this soap curd could be seen on the hair during and after rinsing.

Alkyl sulphate is chemically similar to soap. Both are salts of organic compounds containing long carbon chains, with sodium, potassium, ammonia or other soluble bases. Alkyl sulphate is fundamentally different in that it consists of sulphate ester salts and not carboxylate salts. It suds and cleanses in alkaline, neutral and acid solutions, and it does not form a scum in hard water.

## About the PAPER *in Popular Science Monthly*

Like every big publication, *Popular Science Monthly* has been hard hit by the paper shortage. We are forced for awhile to take, and use in part of each issue, a quality of paper way below our standard. We don't like to see fine illustrations come out on the page looking like soft coal on a tablecloth. But we would rather risk poor paper than cut down the number of copies of your magazine—or worse, the number of editorial pages, which for years has run the same in every issue. As soon as possible, PSM will restore the fine, white paper that helped make it such a well-printed, easy-to-read magazine in the past.

—The Editors

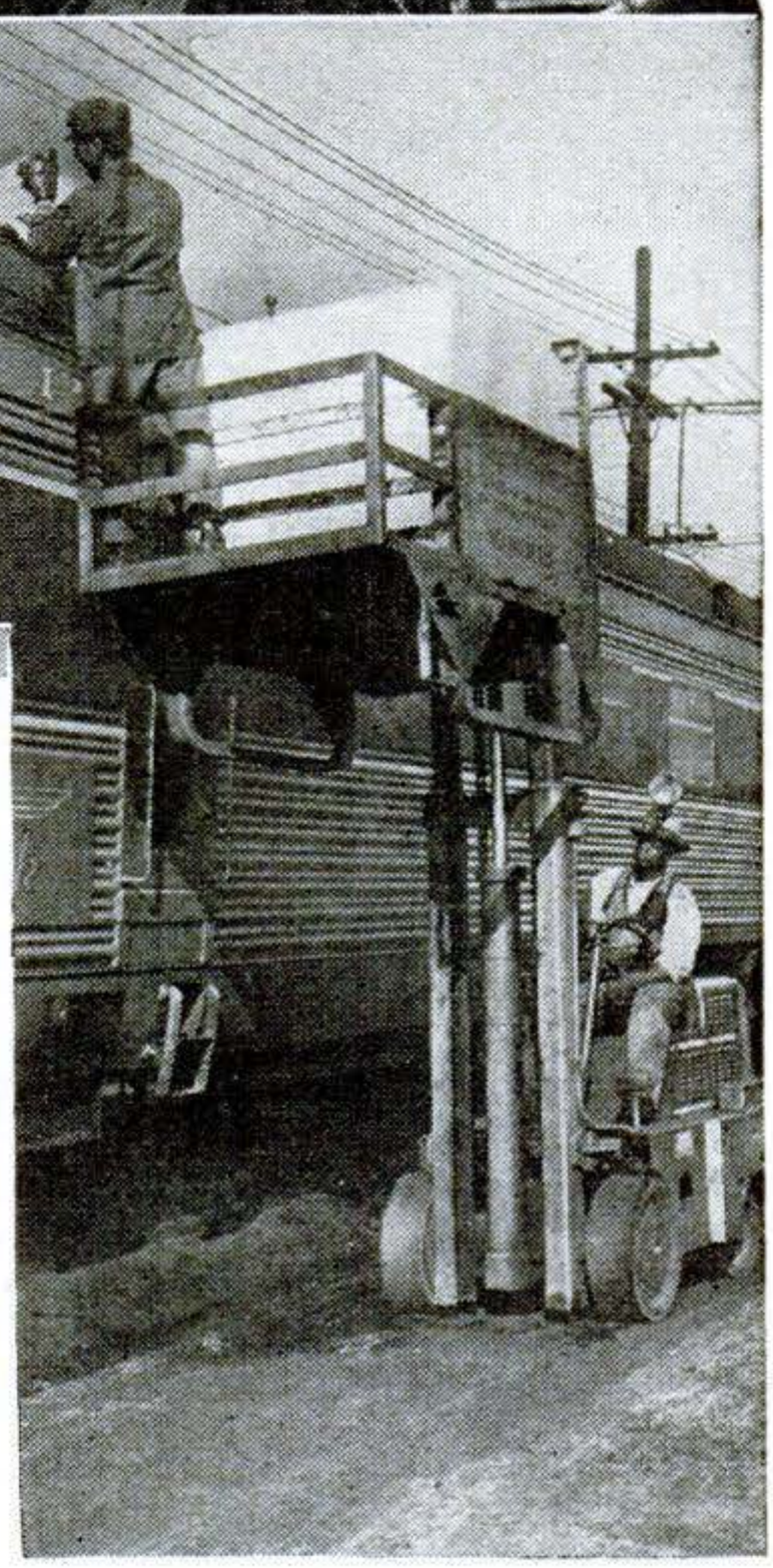


Copyrighted material

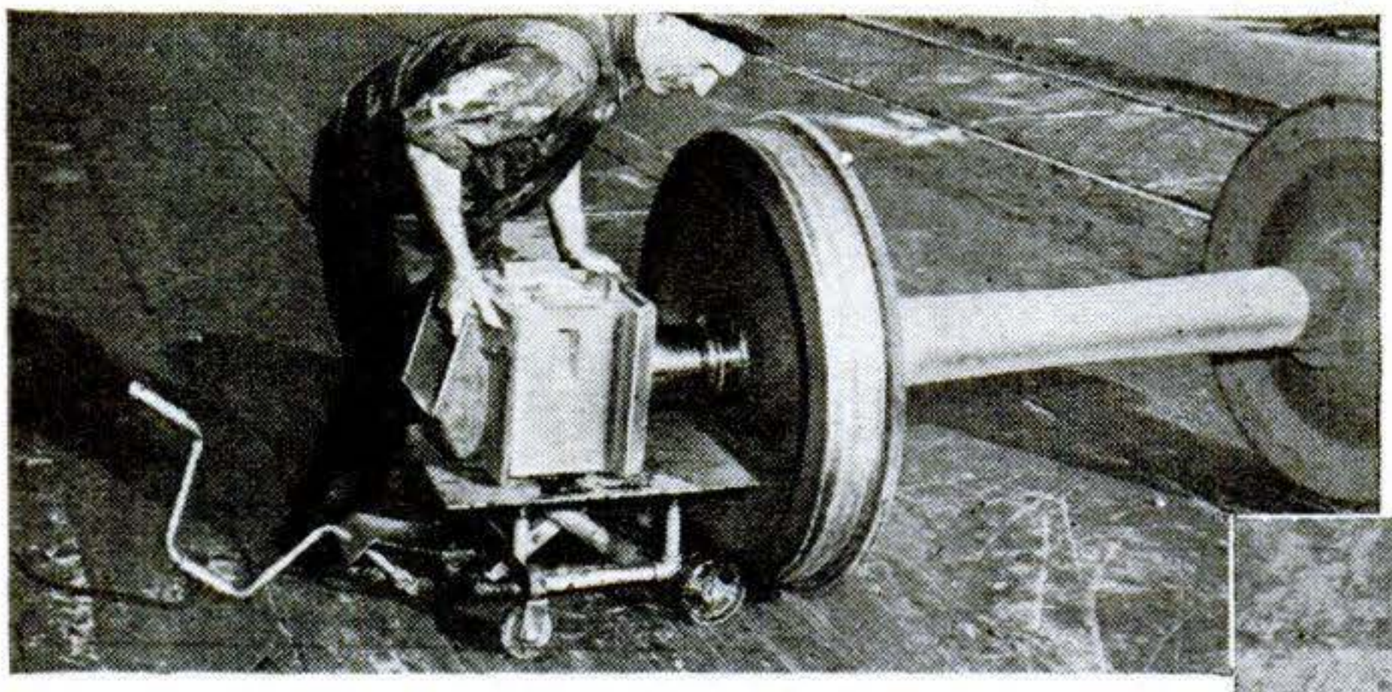
Cutting grease and grime away from a streamliner's wheels with live steam. Workers used to direct nozzle by hand and carry hose. This improvised tripod with swivel top now speeds job.

# Rail Workers Turn Scrap into Tools

Working on the railroad is easier than it used to be for Southern Pacific employees because of labor-saving devices they have built for themselves, usually out of scrap.

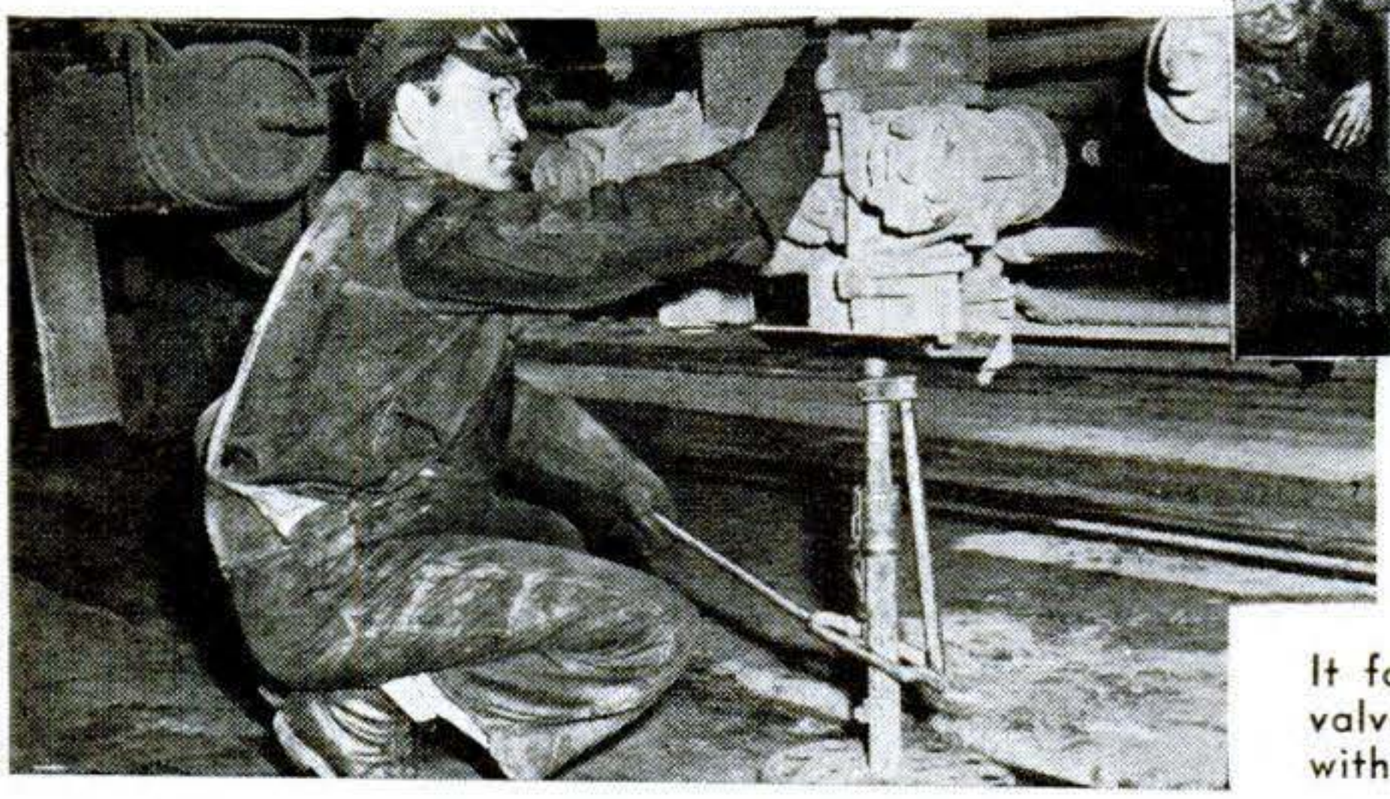


It takes less time and effort to load ice on diners with the help of a tractor-operated lift, which hoists eight 300-pound cakes



Changing journal boxes is no longer a laborious job when the small hydraulic hoist above, devised by workers in the Southern Pacific's Los Angeles yards, is used.

The big jack above, made of second-hand parts, compresses the elliptic springs for car trucks. The whole car used to be jacked up.



It formerly took two men to install triple valves on a locomotive. One can do it now with the simple, improvised jack at left.



Copyrighted material

# Atomic medicine

## *can lengthen your life*

**With available radioactive aids, doctors could learn far more about how your body works.**

Man has more than doubled his life span since Roman times. Atomic medicine now promises to stretch it farther.

**By CARL DREHER**

IN 1912 Dr. Georg von Hevesy, a young Danish scientist, was at Rutherford's laboratory in London, experimenting with radiation and radioactive atoms. Hevesy was a bachelor and lived at a boarding house, where the meals aroused his suspicions. One Sunday he left a little radioactive lead with the remainder of his meat.

Thereafter, every day that week, he took a sample of the meat that was served to him back to his laboratory, and on each day he found it contained a trace of radioactive lead![1]

This was probably the first application of tracer technique in biology, a method that now seems destined to clear up many of the obscurities that handicap physicians. Therapy will follow as the atomic bomb followed knowledge and necessity. Tracer research, in short, means that many of us will have a chance to live longer, happier, more productive lives.

The radioactive lead that Hevesy used in 1912 was radium-D, an intermediate product of the spontaneous disintegration of radium, which meant that there wasn't much of it. Moreover, it was poisonous and hence unsuitable for experimentation on living animals except in very minute quantities. But now practically all the elements, including the common organic components such as carbon, nitrogen, phosphorous, sodium, iodine, and hydrogen can be made radioactive. So medical researchers really have something to work with.

[1]*Radiology,* 35:174, August, 1940.

Dr. Georg von Hevesy's doubt about his hash made history.

These materials are produced by taking a common element, such as red phosphorus, and bombarding it in a cyclotron, an electrostatic generator, or, now, in a uranium pile. Thereupon a radioactive *isotope* is produced.

An isotope is a form of an element that differs in atomic *weight* from the original, because something has been knocked into or out of its nucleus, but does not differ in atomic *number,* or the surrounding electrons that determine its electrical and chemical properties. Thus the common phosphorus that is exposed to the action of the cyclotron is $_{15}P^{31}$, meaning it has 15 electrons revolving in its outer atomic space, and 31 heavy particles in its nucleus. After bombardment with deuterons (heavy hydrogen particles that are themselves isotopic) the phosphorus that emerges is $_{15}P^{32}$: each atom still contains 15 electrons, but the atomic weight has been raised from 31 to 32.

No chemist can distinguish $P^{32}$ from $P^{31}$ by the older chemical methods, nor can the body tell them apart. But whereas $P^{31}$ is stable, $P^{32}$ is radioactive—it emits beta particles, high-speed electrons. In 14.3 days half of these particles will be gone. That is the half-life of this material, which nothing can alter. While it is emitting them, it can be detected wherever it goes, in quantities defying the most refined chemical analysis.

A dynamic picture of what happens in a



Copyrighted material

living plant, animal, or human body, when the organism is functioning normally is thus obtainable. You don't have to overdose it to get a detectable chemical response. The researcher has a tool a million or more times as sensitive as the best quantitative chemical analysis. He can distinguish between a substance previously present in the tissues, and the same substance newly added—as Dr. Robley D. Evans puts it, between the atoms of phosphorus in the enamel of a rat's teeth, which have been there for months, and the atoms of phosphorus that the rat took in at its last meal. Such advantages, combined in a single technique, make this development really momentous.

A number of instruments can be used for tracing and measurement. Photographic emulsions, for example, are fogged by radiation. This property, by which Roentgen discovered the X ray, is employed in the film badges worn by workers in the atomic-bomb plants. Following processing of the film, the amount of darkening can be read on a densitometer, giving the health authorities a record of the amount of radiation received.

Film detection methods are very sensitive. They add up all the radiation received during the entire exposure. But for precisely that reason they do not tell us what happened during any particular part of that period. Specific measurements as of a given time are made with the Geiger-Muller counter (PSM, Feb. '46, p. 121). Its basic element is a glass tube filled with gas at reduced pressure and containing a fine wire running lengthwise through a metallic cylinder. The wire is at a potential of about +1,000 volts with respect to the cylinder. When the tube is placed over the region to be studied the radiation passing into the space between wire and cylinder produces ionization,or electrical conduction, by knocking electrons out of the gas atoms. The result is a surge of current between the two electrodes. In this indirect fashion the instrument acts as a sensitive chemical balance.

This sounds a great deal simpler than it is. Different sorts of radiation do not pass into the ionization space with equal ease. The tube has to be shielded as far as possible from all radiation other than that under observation. Correction has to be made for stray radiation, such as cosmic rays, and the tube and its associated amplifier must be kept in a constant state of sensitivity. The design and operation of Geiger counters is thus a fine art in itself. This, in fact, is true of the whole tracer technique and its applications. It represents an epoch-making development, but one that requires the patience of a Job and the vigilance of an Argus. It is a field for only the most devoted and highly trained scientists.

Not all isotopes are radioactive, and some stable, nonradioactive forms are fully as useful in tracer work as the unstable forms. Heavy carbon, $C^{13}$, is one of these. Since carbon is the principal constituent of living matter, any special form of it is of the utmost importance. Likewise for heavy hydrogen ($H^2$) and nitrogen ($N^{15}$). These materials are traced by spectroscopic methods and by the mass spectrograph, which measures the masses of individual isotopes and thus permits us to distinguish between atoms of different weights.

The utilization of carbon, nitrogen, phosphorus, iron and other elements and their compounds is basic to life, yet we do not know too much about what happens to them in our own bodies or in plants and animals. How is each substance assimilated? What transformations does it undergo in the tissuses? How is it eleminated? Controversies have raged for decades about such questions, simply because of the inadequacy of our means of studying them.

Thus we know that iron is a vital element in the action of the blood, and there is a vast literature on its transport and chemistry in the body, yet Howell, the leading text on physiology, ends up by declaring, "The whole history of the metabolism of iron in the body is surrounded by much uncertainty." Now radioactive iron enables the investibator to differentiate between iron already present and new iron taken up by the blood. So radioactive iron is being used in experiments on normal animals and on animals with artificially induced anemias and a resulting iron deficiency. In time the results may be reflected in the treatment of anemia and other blood diseases in human beings.

Even in fields that have been developed satisfactorily by the older chemical methods, isotope studies may furnish more exact data and eventually improve medical practice. A great deal was known about the secretion of iodine by the thyroid gland before the development of nuclear physics, but tracer studies using radio-iodine enable us to draw accurate curves of the absorption of iodine by healthy and diseased thyroids. Such studies are particularly important in the case of growing children with abnormal thyroids, since a disturbance in this quarter inevitably upsets the balance of the whole glandular system and interferes with normal development.

Another practical application of the tagging technique has clarified the failure of some diabetics to respond to insulin.[2] It was known that this was caused by failure to absorb the drug quickly enough after in-

[2] *Journal of the American Medical Association*, Jan. 8, 1944.



Copyrighted material

jection, and that in certain cases this was due to the practice of injecting repeatedly in the same areas. Pads of scar tissue and fat developed under the skin at these points, making the injection painless and encouraging the patient to continue using that same spot. But the pads also retarded the absorption of the drug. Exactly how much was determined by marking a ¾-inch mercurochrome ring on the skin, in the center of which a standard injection of insulin, tagged with radio-iodine, was made. The Geiger-Muller counter was then placed over the marked ring and the count recorded; this was repeated at intervals of 20 minutes, one hour, and two, four, and eight hours. Thus the rate at which the insulin left the injection site was accurately measured. It was found that after two hours, instead of absorbing 40 percent of the insulin, one patient had absorbed only 10 percent. Of course he was not getting enough insulin, and his sugar content rose accordingly. These tests showed that the advice given to diabetics to rotate areas of injection so that a given site is not used more than once a month is no mere flight of the physician's fancy.

Another example of the use of the tracer technique[3] goes back to the Prohibition era. Many thirsty midwesterners tried an alcoholic extract of ginger, which the Prohibition Bureau had optimistically ruled to be nonpotable. An epidemic of paralysis of the extremities, especially the feet, broke out among the consumers, and public health authorities were faced with a serious problem. Several months of intensive investigation revealed that some of the ginger extract had been adulterated with about two percent of a phenol compound known as triorthocresyl phosphate—TCP—the toxic qualities of which had up to then been entirely unsuspected.

In the 1940s this same drug began to assume industrial importance, and the question arose as to how it would affect workmen who handled it in the processing plants.

[3]Given by Drs. Harold C. Hodge and James H. Sterner, of the University of Rochester, in *Journal of Pharmacology and Experimental Therapeutics*, November, 1943.

CENSORED
(See page 7)

Workers on the Manhattan Project wore small ionization chambers, shaped like fountain pens, in their pockets (below). Any decrease in their charge, read on a special electroscope at the end of each day, showed how much ionization (caused by radiation) had occurred since morning.

CENSORED
(See page 7)

In a special laundry where the laboratory clothes of people working on radioactive substances were decontaminated, the instruments above measured radiations that might be coming from the clothes both before and after they were laundered.

The film badge (left) was a good check against pocket ionization chambers. Workers regularly exposed to radiation in atomic-bomb plants had to wear both. All the film except for a small window was covered by a thin metal shield. Radiation that passed through the paper protecting the film in the window clouded the film's emulsion.

CENSORED
(See page 7)



Copyrighted material

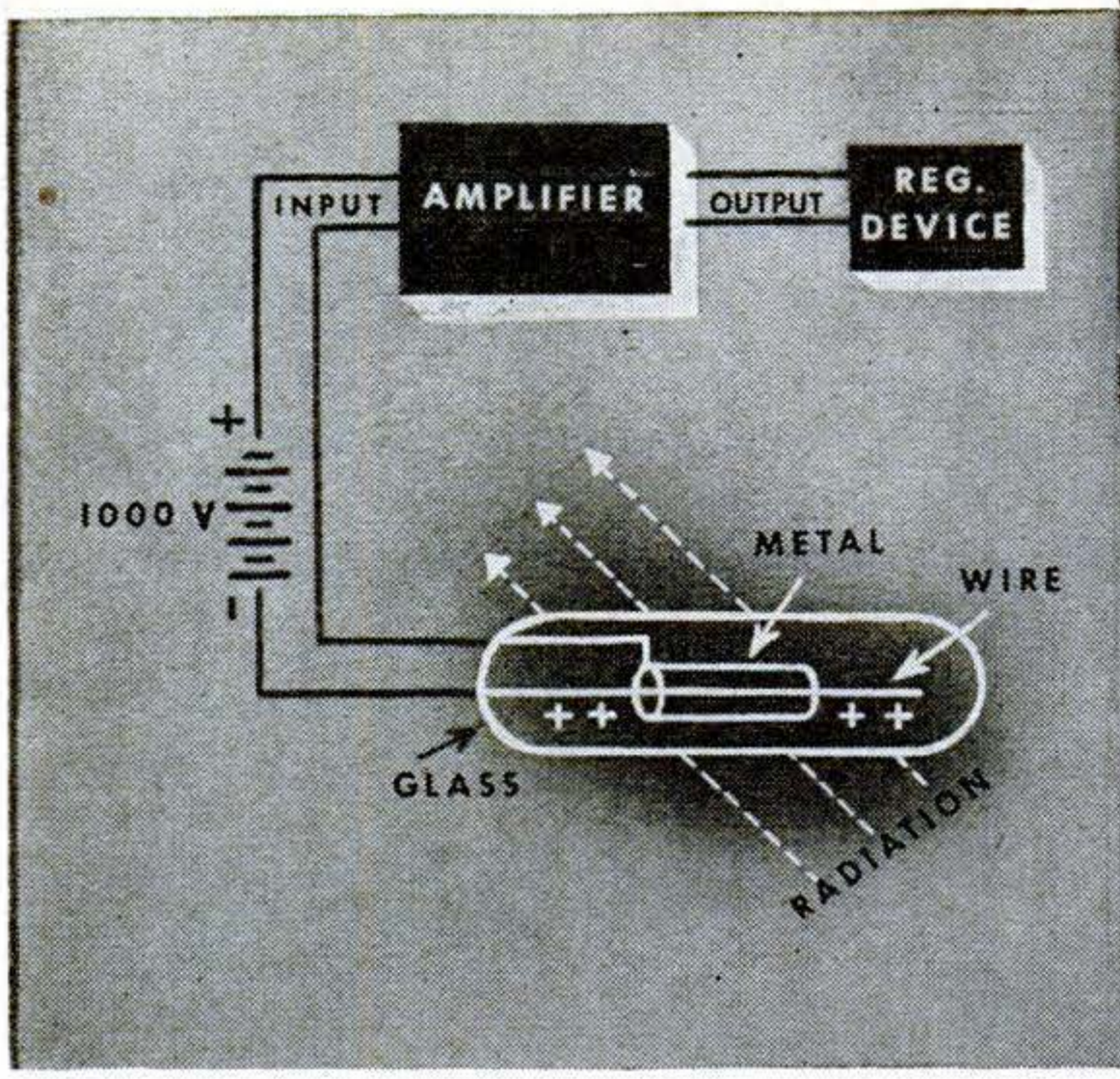
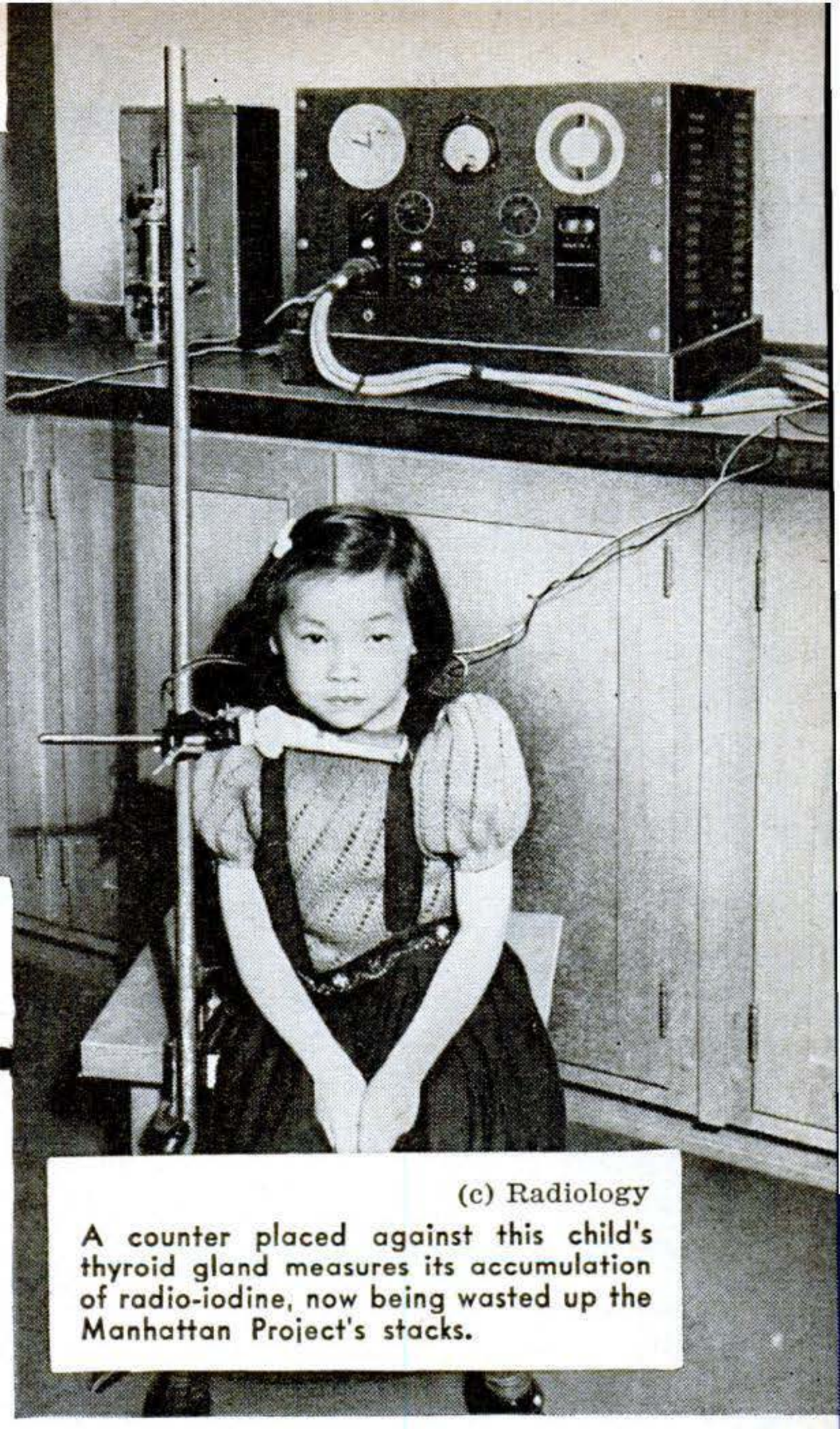



Diagram of a Geiger counter, highly sensitive detector of radiation. A single charged particle, entering the gas-filled tube, can be recorded.



(c) Radiology

A counter placed against this child's thyroid gland measures its accumulation of radio-iodine, now being wasted up the Manhattan Project's stacks.

Specifically, how much of it would they absorb through the skin of their hands? The radioactive tracer technique was employed. Experimenters applied small quantities of TCP, labeled with radioactive phosphorus, to the palms of their hands. Blood and urine samples then were tested for radioactivity and the amount of the drug absorbed was calculated. Very appreciable quantities rapidly entered the blood stream. Consequently there was serious danger that workmen handling the stuff routinely, without precautions, would develop "ginger paralysis." Animal experimentation confirmed this conclusion. Processing methods were accordingly modified to prevent skin contact.

More recently, studies of the healing of bone, made on rats, have been reported.[4] The animals were anesthetized and lengthwise cuts made in their leg bones with a small circular saw. During recovery they were fed radiostrontium and radiophosphorus, and the uptake of these substances by the healing cut was measured with a Geiger counter. The results indicated that the time required to reach a maximum uptake might be used as a measure of healing. Presumably this could lead to evaluation of the mending of fractures in human subjects.

About half a million Americans suffer from epileptic seizures of varying intensity. The causes of this disease are still largely obscure. The psychological make-up of the epileptic has been studied, and comparisons have been made between the electrical waves of the brains of normal subjects and those that characterize epilepsy. Now the metabolism of the brain is being studied by means of radioactive sodium and potassium used as tracers—in the hope that the biochemical basis of epilepsy may be discovered[5].

Tracer technique, however, is not the only contribution of nuclear physics to medical research. There is also the direct radiation from the cyclotron and other nuclear transformers, which may prove preferable in the treatment of some cancers to the older types of radiation generators, such as the X-ray tube and radium. To make this possible it is first necessary to *collimate* the output of the newer devices, to project the particles in a beam that can be directed on a particular region of the body. But control of the radiation is only a beginning. It is equally necessary to know how much can be used safely, i.e., to standardize dosages. In some instances the answers are known; others are

[4] By Drs. Alfred Marshak and R. L. Byron in *Journal of Bone and Joint Surgery*, January, 1945.

[5] This work is being carried on at the University of California Medical School.



Copyrighted material

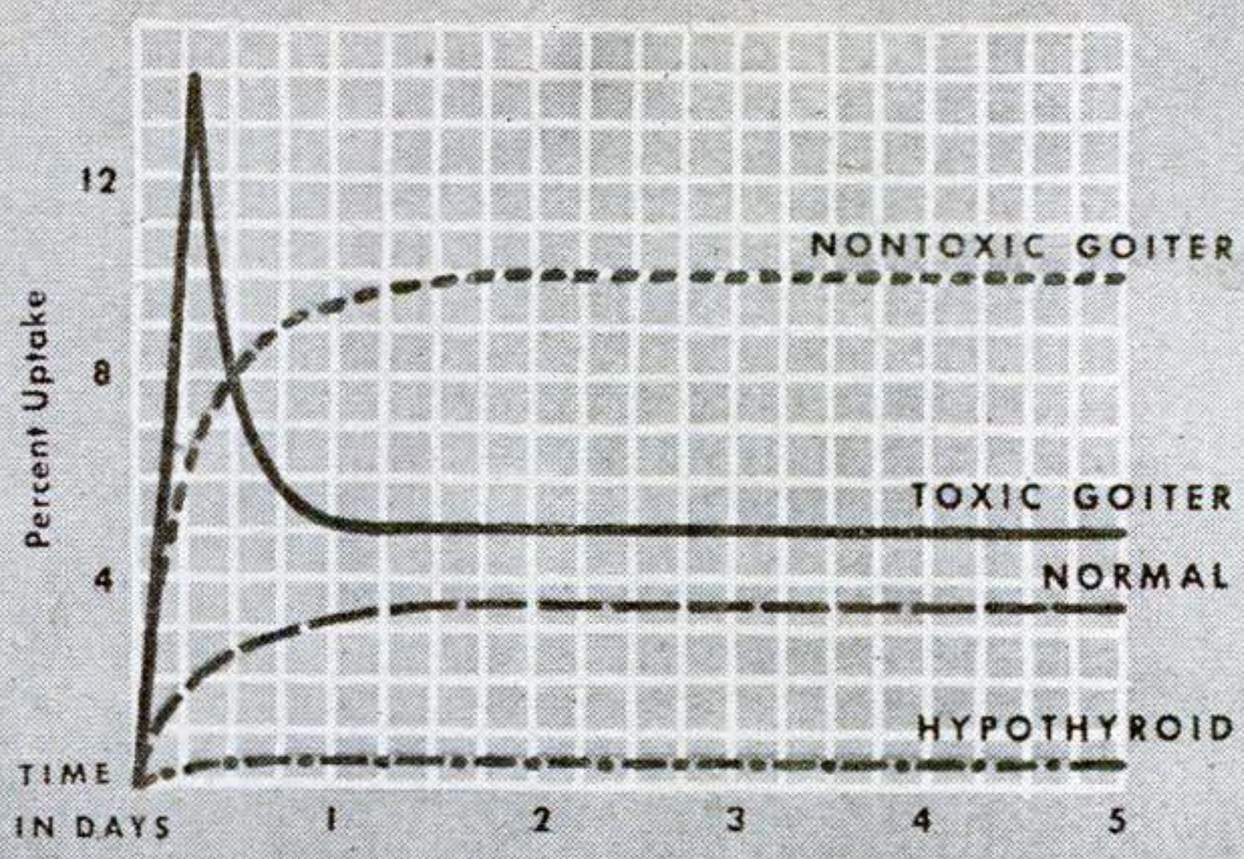
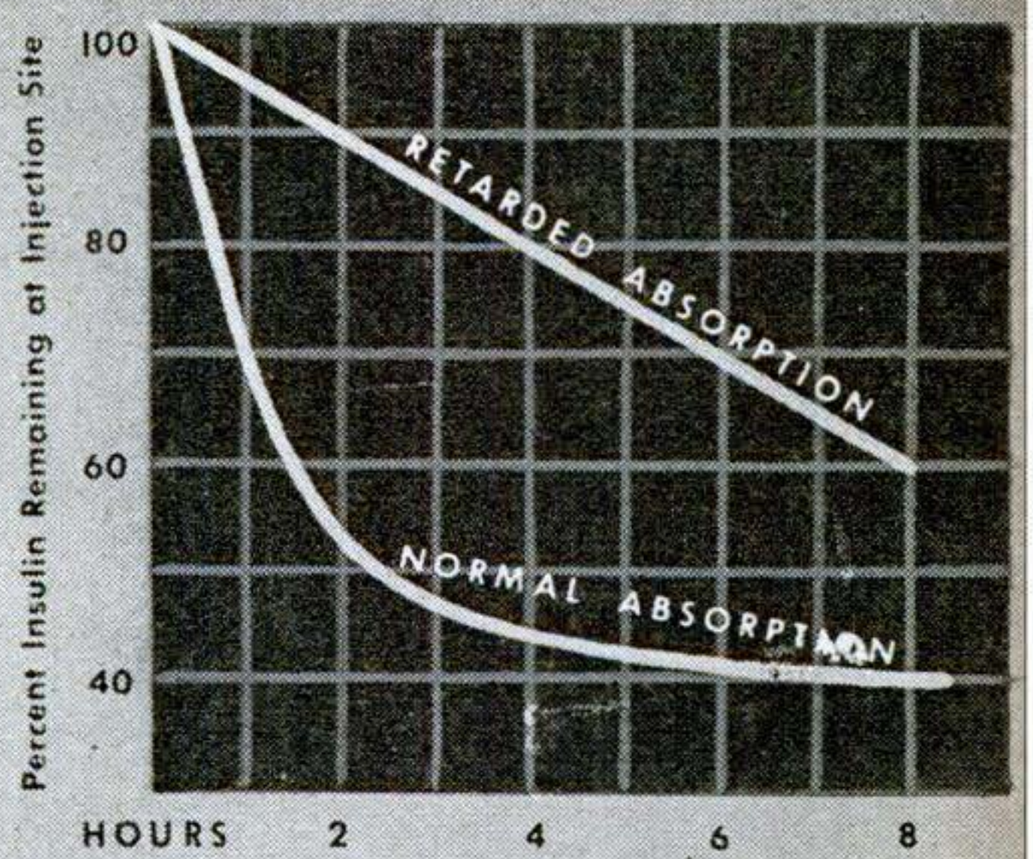



Chart shows the speed and degree with which thyroid glands in various condition absorb radio-iodine. Sharp peak marks impact on toxic goiter.




Counter record of how two diabetics responded to radioactive insulin. Top line shows how absorption was retarded by fat at the injection point.

still in the stage of animal experimentation. One method is to cultivate malignant tumors in mice, expose fragments to definite quantities of radiation about which information is sought, transplant the fragments to healthy mice, and compare the proportion of resulting "takes" with similar tumor sections exposed to X-radiation. It takes thousands of tests of this sort before application to human beings can be thought of.

These are only a few samples of the work being done. Artificially produced isotopes have been available less than 12 years. Soon after the investigators developed their techniques and the materials began to be available in practical quantities, the war broke out and long-term medical research took a back seat for four years. E. O. Lawrence tore apart his biggest cyclotron, then under construction; the electromagnet was needed in the atomic-bomb project. The older cyclotron, in which a good part of the isotopes used in medical research had been produced, was also turned over to the Manhattan District. Most of the nuclear physicists went with the equipment, and many of the research teams of physicists and physicians were broken up just when they were beginning to get results. It was all necessary and inevitable, but it was a setback.

Yet it may have been bread cast upon the waters. Those same four years produced not only the atomic bomb, but a prodigious amount of know-how and equipment directly applicable to medical research. At one leap we have moved from the age of scarcity in radioactive materials to the age of plenty. In the production of neutrons one chain-reacting pile is said to be the equivalent of a million cyclotrons, and a good-sized cyclotron is the equivalent, for some therapeutic purposes, of about two pounds of radium, or the entire world stock in 1940.

"Controlled nuclear energy has become a reality," declared Dr. Andrew H. Dowdy, associate professor of radiology and director of atomic medical research at the University of Rochester, in a recent speech. "And with this reality a new era has been born. There is no turning back. The responsibility rests largely in the hands of the American people, but it is a responsibility that must be shared by the other nations. The hazards are admittedly great, but the benefits are so tremendous as to stagger the imagination."

Although we now have, potentially, more radiation than we can use, we still lack trained men—and money. Here, in the greatest and richest country in the world, scientists in charge of research projects concerned with matters of life and death still have no alternative but to run from one foundation to another, raising $1,000 here and $500 there, instead of spending their time in their laboratories. But if we prove capable of an intelligent appreciation of the vital importance of research, scientific medicine is sure to make great strides in the understanding of its subject matter, and, eventually, in the conquest of disease.



Copyrighted material

# GRAVEST ILLNESSES *are tasks for* atomic research

THERE is no royal road to therapy. Optimistic expectations that recent developments in atomic technology will lead to a swift and easy solution of the more intractable problems of medicine are doomed to disappointment. Radioactive isotopes and the new forms of radiation are extremely important, but there have been important developments before and people still get sick and die—although they do live a lot longer, on the average, than they used to.

In medicine the toughest assignments always go to the latest arrival. Nobody is calling on nuclear physics for help in combating the ravages of chicken pox or poison ivy: it is the heavyweights like leukemia and cancer that we have to deal with. Abundance of radioactive materials, moreover, will bring hazards in its train as surely as benefits. These are lethal agents, not only against disease, but against anyone who gets in their way through careless or ignorant use. Even experienced radiologists have to watch their step constantly lest, from a few roentgens here and a few there, they accumulate enough radiation to make them sick, or to kill them.

The splendid safety record of the Manhattan Project was the result of first-rate medical supervision, tight military control, and unrelaxing vigilance. Everything—the people leaving the plants, the coats, of the laboratory technicians, the furniture, the water, the very dust in the air and the air itself for miles around—was tested for stray radiation. We don't have to make the country a Manhattan District, but we do have to see to it that radioactive products are released only to people who know their dangers as well as their potentialities. In such able hands, and in no others, these substances can help us conquer the murderous heavyweights among the human body's foes.

All parts of the body are dependent on a continuous and ample blood supply. The lower extremities are peculiarly liable to peripheral vascular disease (vascular refers to blood vessels and peripheral to outlying ones). Prolonged immersion and exposure can also get the legs and feet into grave trouble; there were many such cases in the merchant marine and the air forces during the war.

A surgeon may know he must amputate —but where? There is a great difference between taking off a leg above the knee or below as far as restoration of function is concerned. But if the blood supply is not good enough to enable the wound to heal, the knee will have to be sacrified in a second operation, with all its additional suffering, discouragement, and danger.

What the surgeon needs is some objective method of measuring the circulation of the blood to supplement his clinical faculties. Such a method has recently been reported.[6] A tracer dose of radiosodium is injected into the patient's arm. A shielded Geiger-Muller tube has previously been positioned against the sole of the foot. An electric stop clock is started simultaneously with the injection, and counts per minute are recorded for the next hour. Radiation from the foot increases rapidly at first and then more slowly. A series of such runs on normal subjects establishes a normal circulation pattern in the form of a family of curves. There is considerable variation among subjects, but the highest readings are only about 50 percent above the lowest, and the results—in normal subjects—are the same for both feet.

When something goes wrong with the circulatory apparatus the curves usually, although not invariably, fall outside of the normal range. More *(Continued on page 210)*

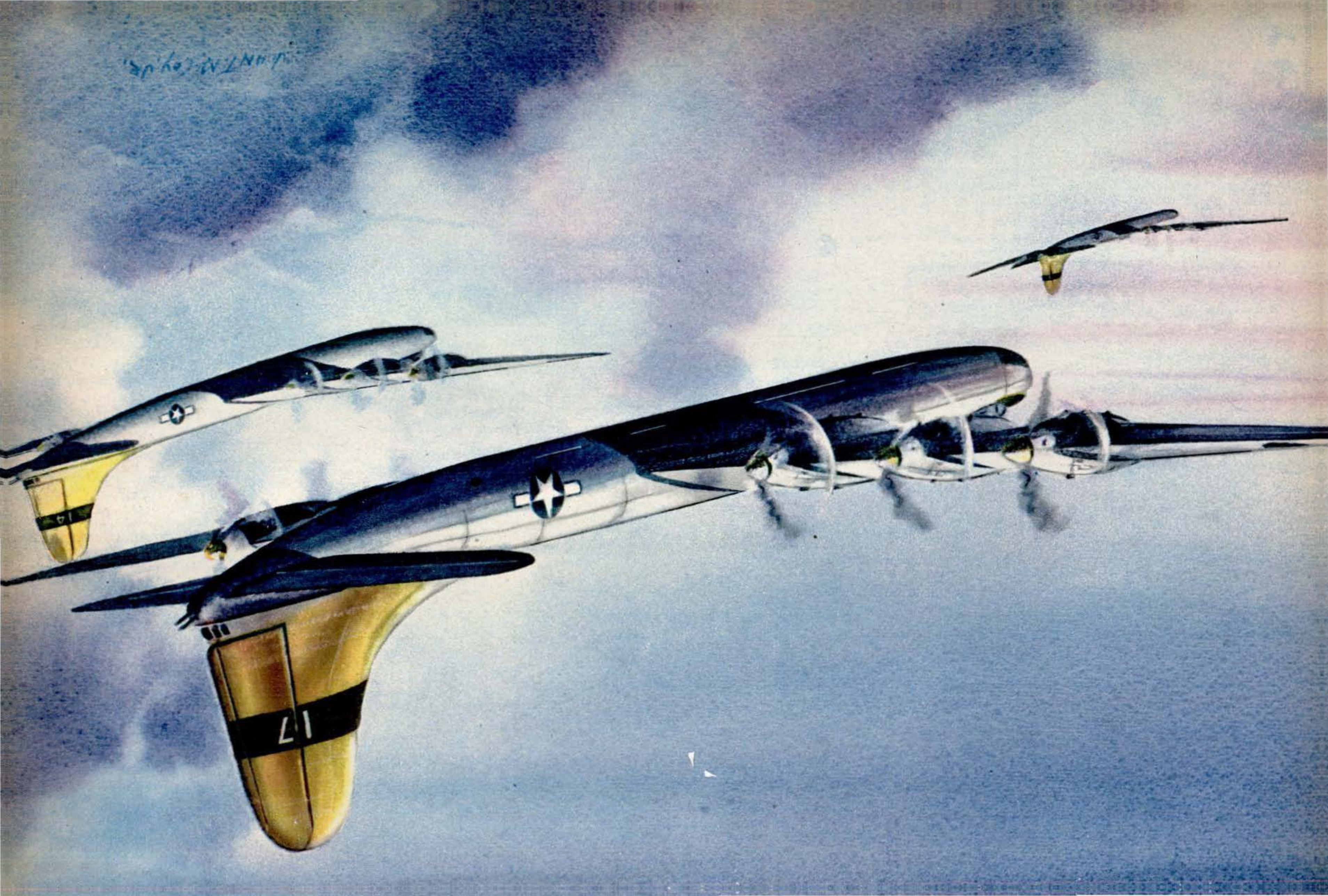
[6]By Drs. Beverly C. Smith and Edith H. Quimby of the College of Physicians and Surgeons of Columbia University, in *Radiology*, October 1945.

PIN-UP

**XB-36 SUPERBOMBER.** This giant Consolidated-Vultee plane, still to be test flown, will be powered by six pusher-type, Pratt & Whitney Major engines, each developing 3,000 hp. plus. The superbomber, which requires a flight crew of 17, will have a maximum gross weight of 132 tons. Its commercial version, Model 37, will carry 50 tons 1,500 miles without refueling.



Copyrighted material


41

Inventor Sam Miller demonstrates how easy it is to load his tree-planting gun. Artist's sketch at the right indicates the moving parts and shows a small seedling tree, its roots wrapped, lying in the slot. A step on the foot rest and another tree is planted for harvest 100 years from now. A man can carry and operate this tool all day without tiring and put in some 2,400 seedlings at a walk.

# NO Squat, NO Stoop

## ONE MAN CAN PUT IN 2,400 SEEDLINGS A DAY

A SMALL, spadelike, tree-planting gun now promises to speed up the reforestation of millions of acres of burned-over forest lands on the West Coast. This little mechanical tree planter was perfected by Sam Miller, an Oregon state forestry employee, after three years of trial-and-error experimentation in the field.

Armed with this sapling-shooter, a workman recently set out 2,400 seedlings in a day on the fire-killed acres of Oregon's vast, 300,000-acre Tillamook burn. Foresters cheered this performance because restocking of burned areas in the past has been laboriously slow. Using the crudest hand tools, it took back-breaking labor to plant 500 small trees a day. Also, with this old method of replanting, labor costs ran to about $15 per acre. With the Miller tree gun these costs are cut to about $5 an acre. This is important, for it means that reforesting burned-out areas is now economically practical for private timberland owners. State and national agencies benefit, too; they can plant three times as much devastated land with the same money.

The new tool looks like a narrow garden spade, except that the blade is replaced by a long, steel finger about an inch by two inches in size. It has only three moving parts: a trigger grip built into the handle, a togglelike spring, and an ejector bar running the full length of the finger and connected to the grip by a steel rod.

To operate the tool, the workman takes a seedling from a carrier hung under his arm, and sets it, roots down, in a depression in the finger of the gun. Placing the daggerlike tip to the ground, he steps on the foot rest and sinks the gun about 10 inches into the soil. He then grips the handle like an aerial gunner squeezing a machine-gun trigger, and the tree is planted.

The general pattern for planting in commercial forests of the West is at six-foot intervals. While the man with the gun is taking two steps along the line he is working, he has time to insert another tree in the slot. Survival of these seedlings planted with the gun during the past three years of experimenting has been almost 100 percent. By the old stoop-and-squat method, survival rarely exceeded 60 percent.



Copyrighted material

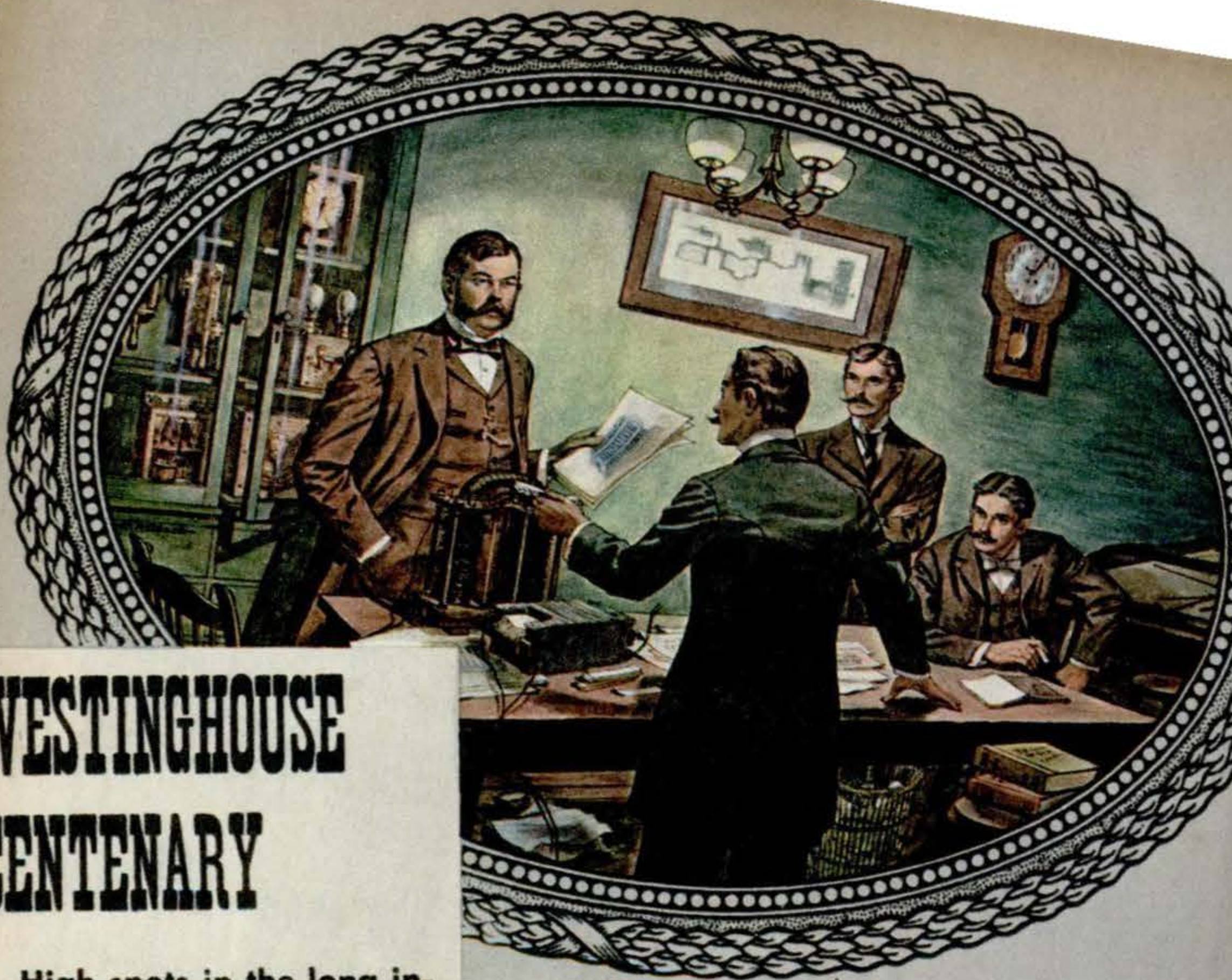
With the tip of the tool in the ground, operator merely squeezes the grip inside the handle and the tree is in the soil and on its own. The sketch shows how rod trips the ejector to release plant.

After he withdraws the planter, the workman jabs the ground to fill in the soil around the roots of the tree and then stomps hard on the surface to remove air pockets. Another forest giant is started.

# with Mechanical Tree Planter

The old-style method, using a mattock or hazel hoe, was laborious. Only about 500 trees a day could be planted.

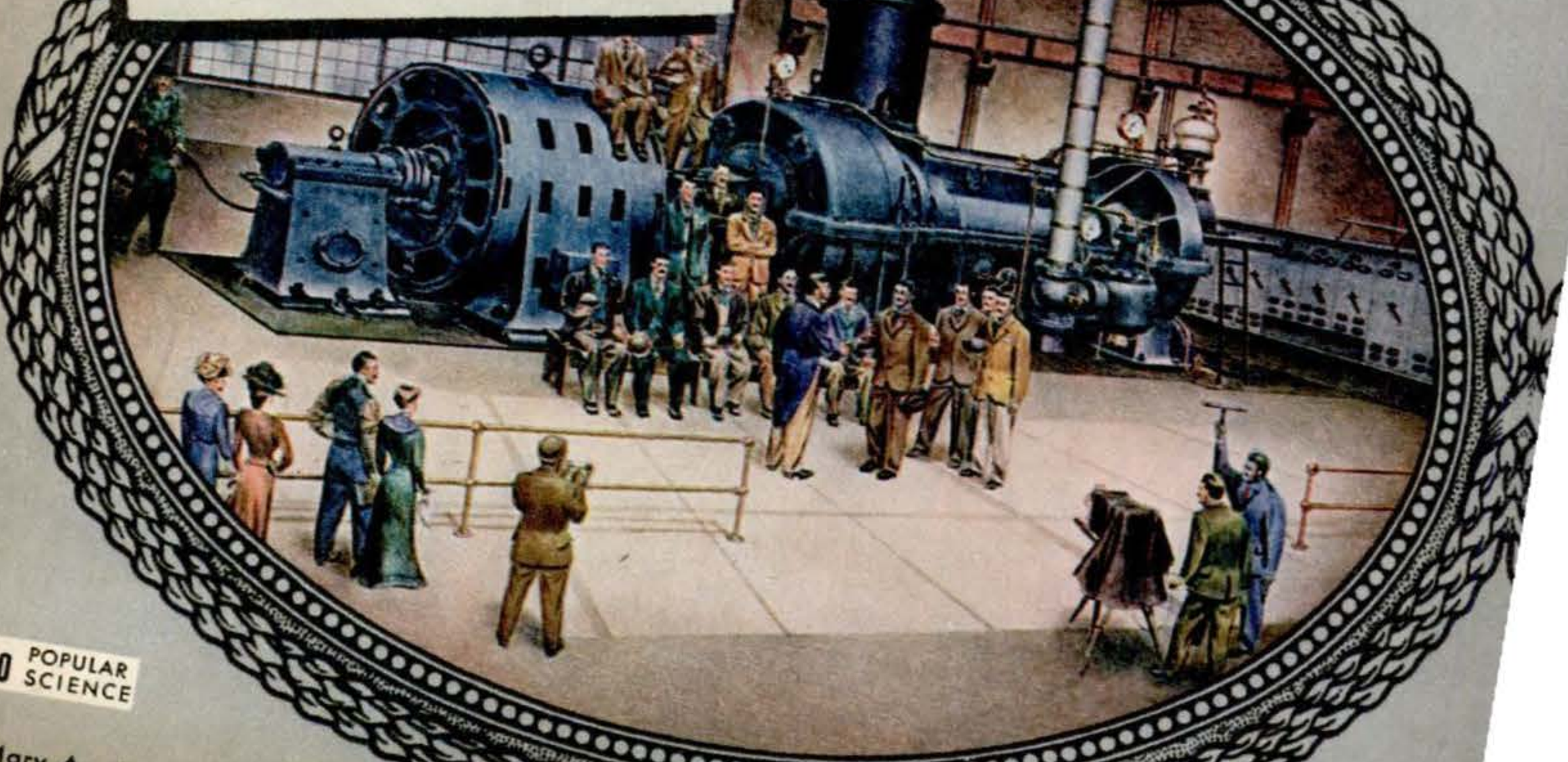
The new tree gun will speed replanting of Oregon's 300,000-acre Tillamook burn below.



# WESTINGHOUSE CENTENARY

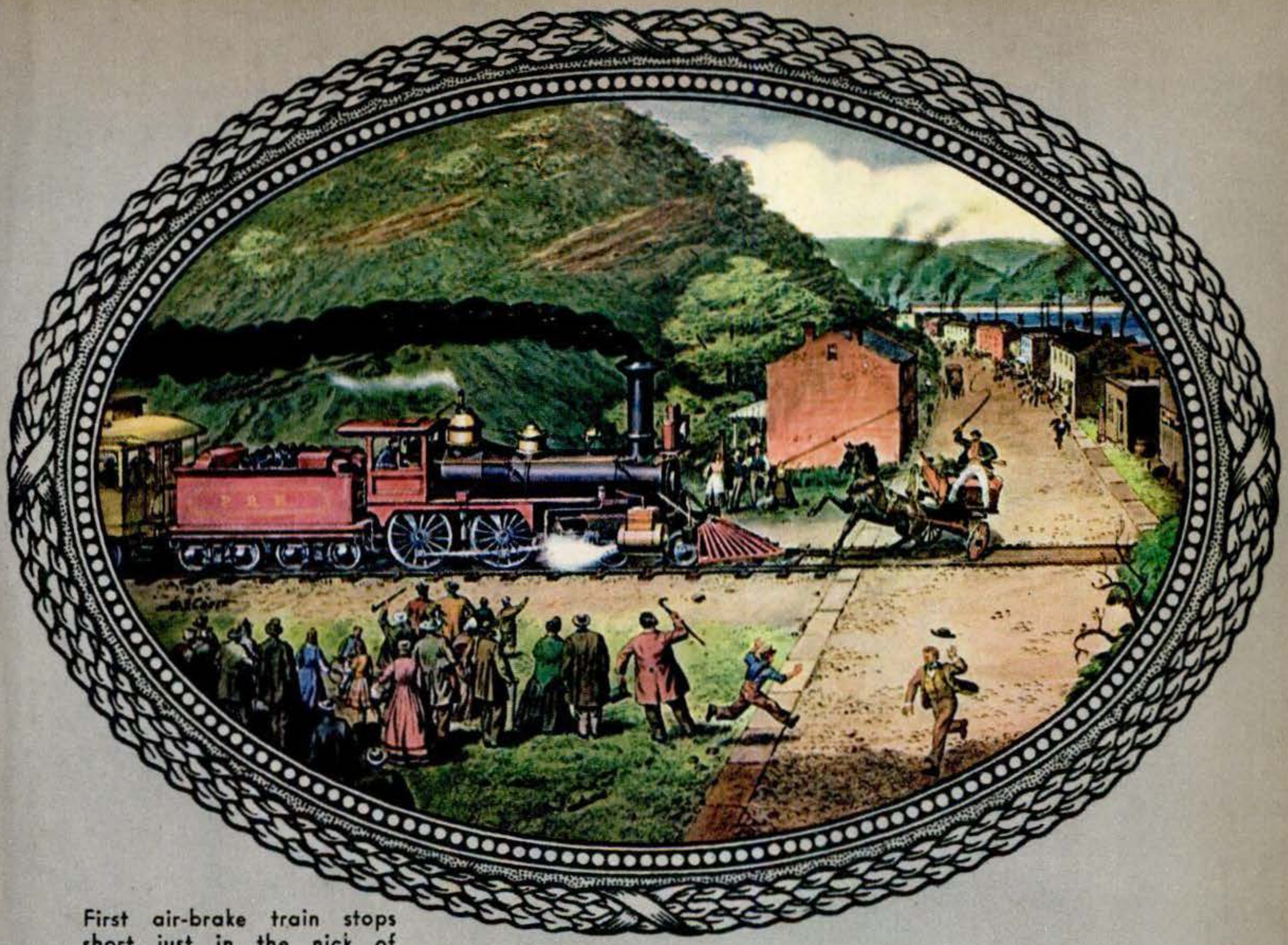
**High spots in the long inventive career of George Westinghouse are recreated in these paintings, which are based on meticulous historical research.**

In 1885, direct-current stations served only 16 square miles. Westinghouse found how to extend area by A.C.





lary Ann," 2,000-kw. steam-turbine generator, was the first unit of the



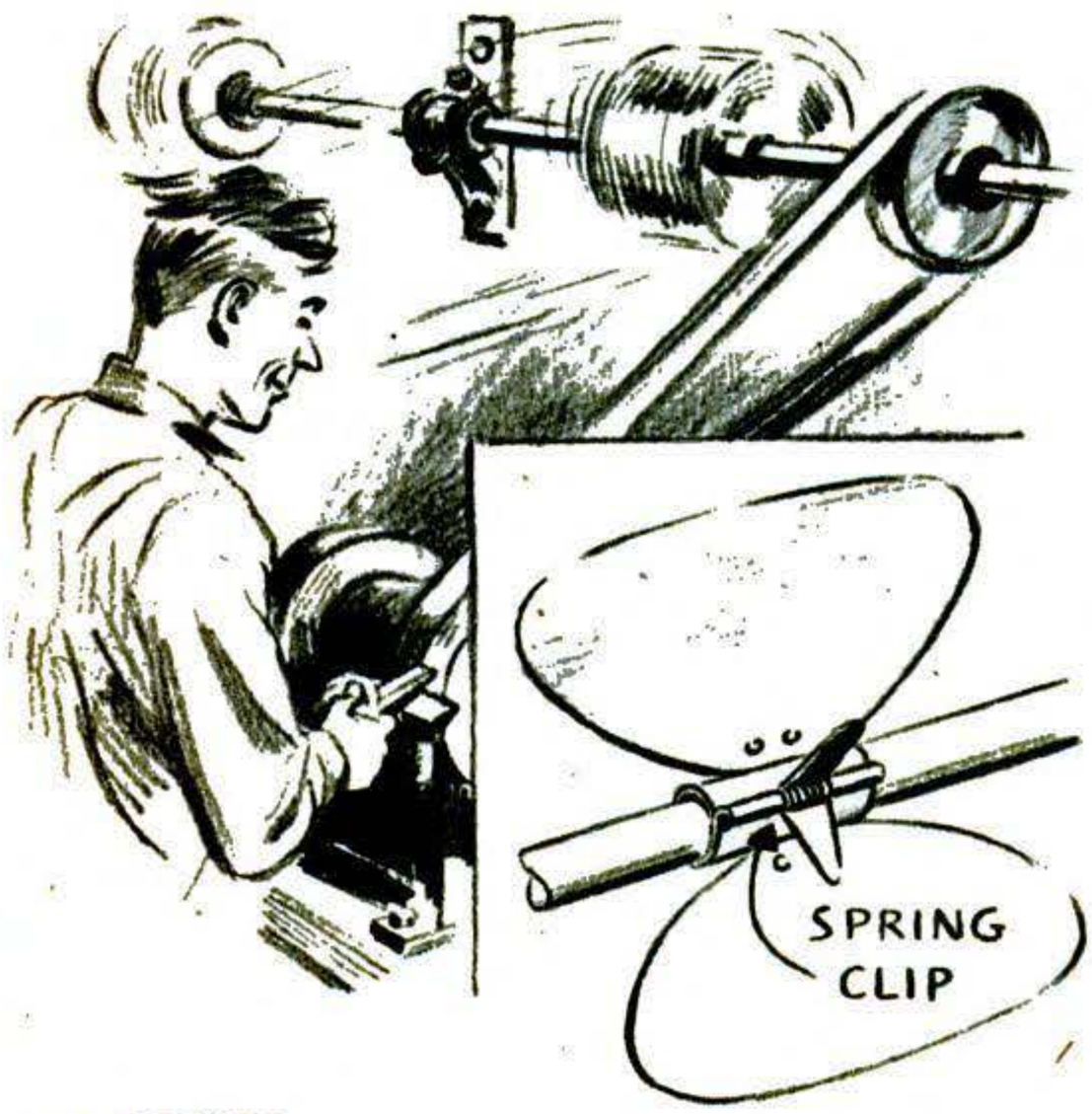
First air-brake train stops short just in the nick of time and convinces witnesses of its quick efficiency.

Big night in Great Barrington, Mass., was when Westinghouse proved that town could be lighted with A.C.

# NEW IDEAS

**First Aid to Fishing Rods.** If the tip guide, or eye, breaks at the end of a fishing rod, it can be made good as new at short notice by this invention of Morris S. Licht, Cleveland, Ohio. It consists of a detachable loop threaded to fit a second piece attached to the rod itself. The device may be adapted to fishing rods of all kinds and sizes, whether they are made of bamboo or of steel.

**Right Way to Hang Boots.** Here's a simple and convenient new gadget for drying and airing boots, waders, and shoes. It was devised by Harvey W. Hill, Parkville, Mo., to provide a means whereby the damp interiors may be made grippe- and pneumonia-proof. A circulation of air is obtained by suspending the footwear upside down with a clamp arrangement that is easily adjustable with a nut to the size of the sole. A hook attached midway of the clamp permits the boot to be hung from any hook. Gravity makes the water drip; ascending warm air dries the inside.



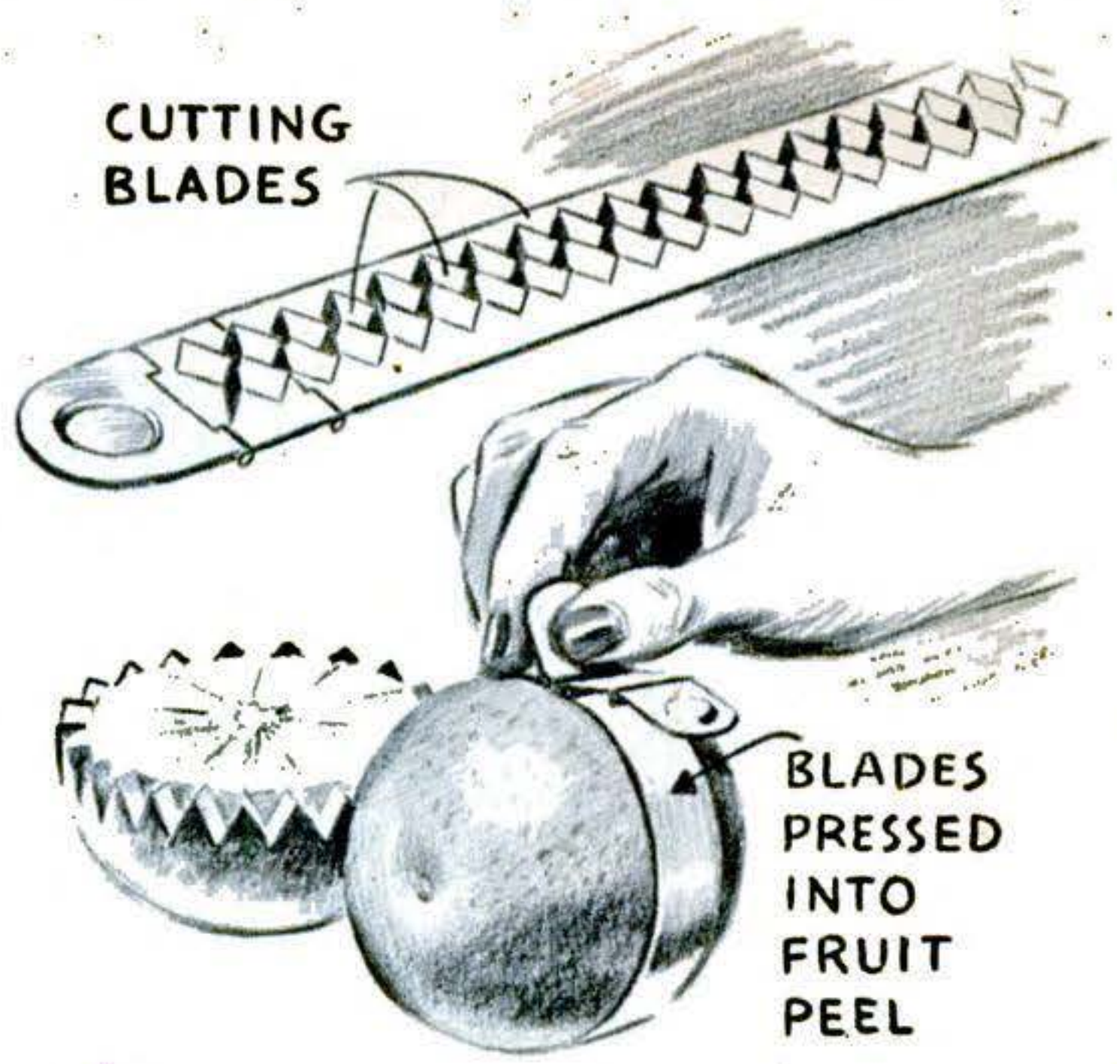

**Clip Fan for Line Shafting.** For the comfort and efficiency of workers in factories where line shafting is used and ventilation is bad, Louis A. Gutkin, Winnipeg, Manitoba, Canada, has invented a two-bladed fan that can be clipped to the rotating shaft above a workbench. Blades may be made of any light material, such as a building board, plastic, or metal, and, through a variation in the method of attaching to the hub, can be either permanently fixed or adjusted as to pitch. The two-piece hinged collar that grips the shafting is lined with rubber or other suitable material to prevent slipping. The device is simple to manufacture, easy and quick to adjust, and can be adapted to various sizes of shafts.

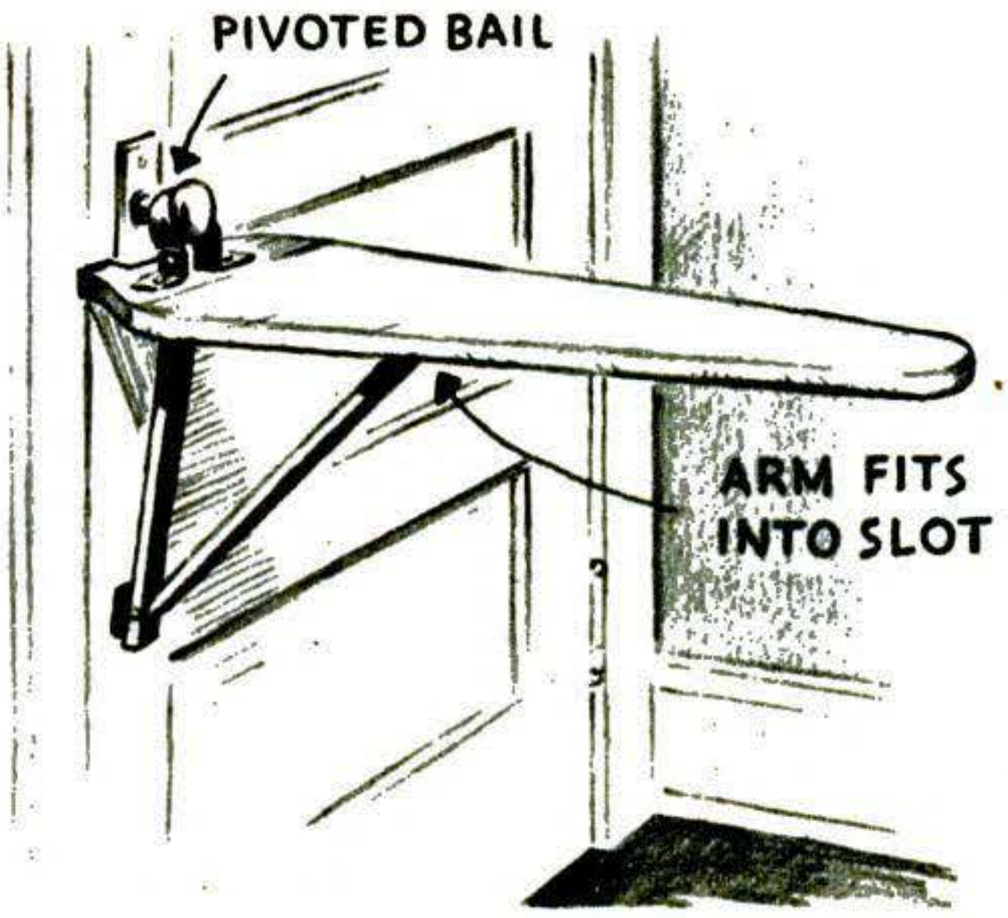


Copyrighted material

# FROM THE INVENTORS

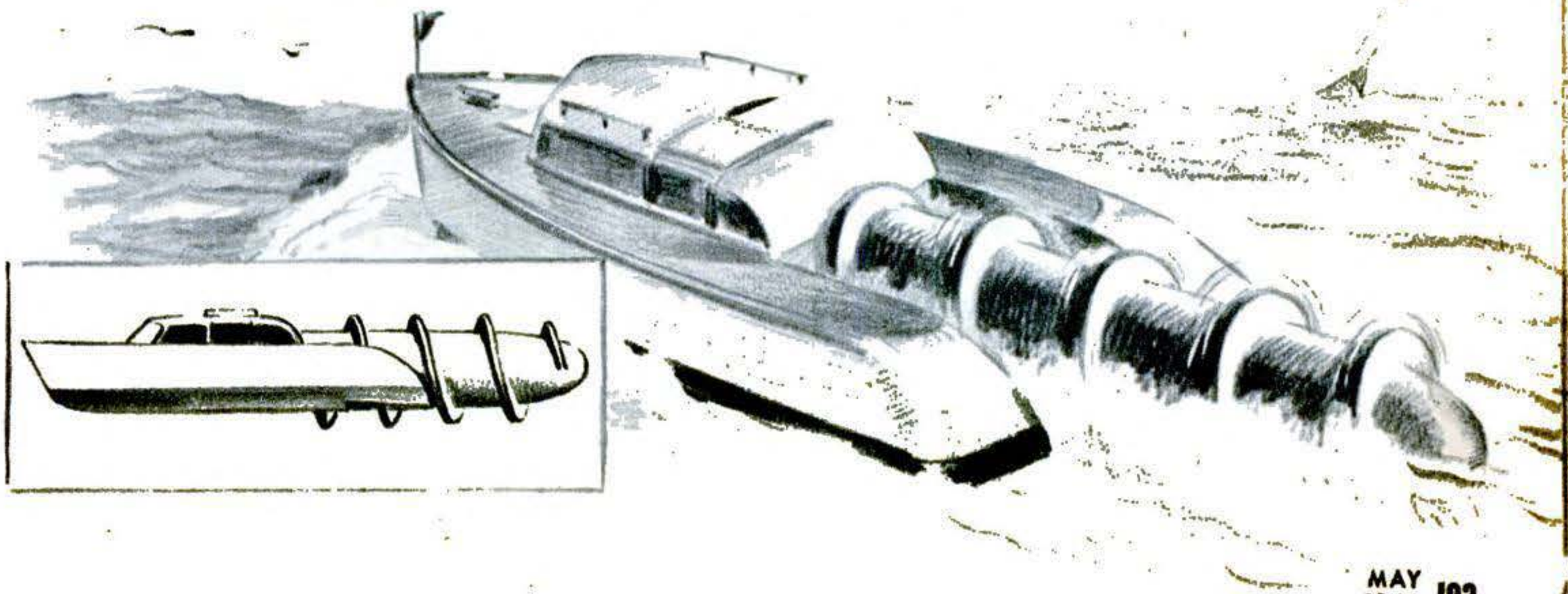
**Fancy Fruit Cutter.** Housewives who like to serve attractively cut fruits will no doubt welcome this flexible band knife, which is the idea of Phyllis K. Fellner, Los Angeles, Calif. The band, with cutting blades on the inside, is drawn around any spherical fruit—oranges, cantaloupe, etc., leaving a deep pattern on the skin or rind. After this is accomplished, the fruit is halved with a knife, leaving the edges as cut by the band. The cutting pattern can be varied so that the edges may be either scalloped or serrated.

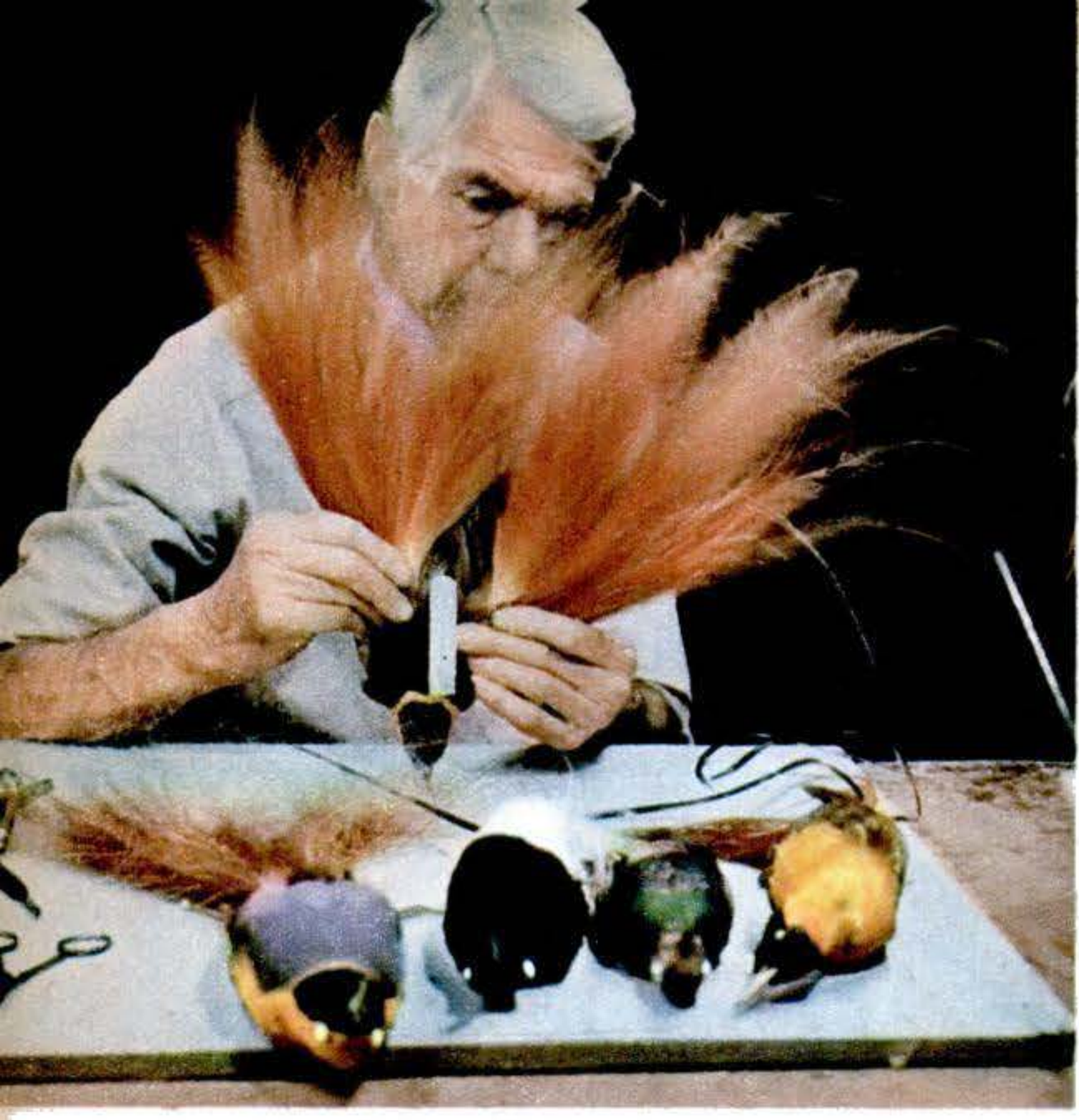



**Doorknob Ironing Board.** Just in time to be of small aid to those suffering in cramped quarters comes this small-apartment ironing board devised by Viggo Rasmussen, of Minneapolis, Minn. It is designed to fold into a readily stowable form, and requires only a moment to set up and attach to any convenient door handle ready for use. A loop fixed to the wider end of the board hooks over the doorknob, and a triangular bracket brace underneath is constructed so as to give it rigidity and prevent side sway in either direction. When the ironing job is finished and the board is collapsed for storage, it occupies little space in a closet or behind any open door.

**The Worm Turns.** The new type of boat illustrated below has been specially designed for propulsion by a kind of turbine in reverse. The after end of the hull is recessed to accommodate the propeller mechanism, which is in two cylindrical sections, one inside of the other. The inside division is stationary and houses the power unit, while the outside section, which revolves, is fitted on its exterior with a spiral fin or blade. When this turns, boring through the water like an auger, there is a long-continued thrust that sends the boat forward at a steady speed. Unlike the conventional propeller, the device makes a continuous "bite" at the water over a considerable distance. Forward of the propeller is a cabin with control apparatus. The man who invented the boat is Harold B. Harvey, Pensacola, Fla.





## Only Experts Can Mount Gaudy Bird of Paradise

ONE step in the preparation and mounting of birds of paradise—regarded as the most artistic and highly skilled work in taxidermy—is demonstrated (left) by Raymond B. Potter, of the American Museum of Natural History. He is spreading the wing plumes of the male to show the bird in all the brilliance it attains when courting the drab little female.

Found only in the New Guinea area, this gaudiest of birds requires the most delicate handling to display it in an erect and lifelike position. Each quill tip under the skin layer must be set exactly and then "frozen" by a film of clay. For stuffing, excelsior is shaped to the contour of the body, and cotton-wrapped wire is run through the neck and legs.

## Honorable Discharge Pin Has Become Collector's Item

THOUSANDS of men of the United States Maritime Service, who delivered the goods vital to Allied victory, proudly wear the honorable discharge pin shown at right. But official orders recently halted distribution of this pin, thus making it a collector's item.

## New 60-Pound "Plastic Lung" Will Aid Polio Victims

A NEW type of breathing-aid apparatus (above), made mostly of plastic and weighing only 60 pounds, has been developed to help victims of infantile paralysis and others suffering from a breakdown of the respiratory organs. The "lung" also will be valuable as a resuscitation unit.

## Treated Oil Won't Bubble Up

THE serious handicap of foaming oil has been eliminated in high-speed motors of trucks, tanks, ships, and other vehicles. Blowing through two straws, the young lady below shows that oil in the beaker at the right, treated by anti-foam agent developed by Gulf Oil Corp., won't bubble over. The beaker at the left shows how air can make untreated oil froth like warm beer.

Copyrighted material

Mud, if it is the right kind, saves time and money for oil drillers. Many thousand tons of it are used every year in boring. It's a lubricator, bit cleaner, gas-pressure guard.

# Mud THAT'S WORTH MONEY

## "MINED" IN A DRY LAKE BED, IT LUBRICATES BITS THAT DRILL FOR ADDITIONAL SOURCES OF OIL

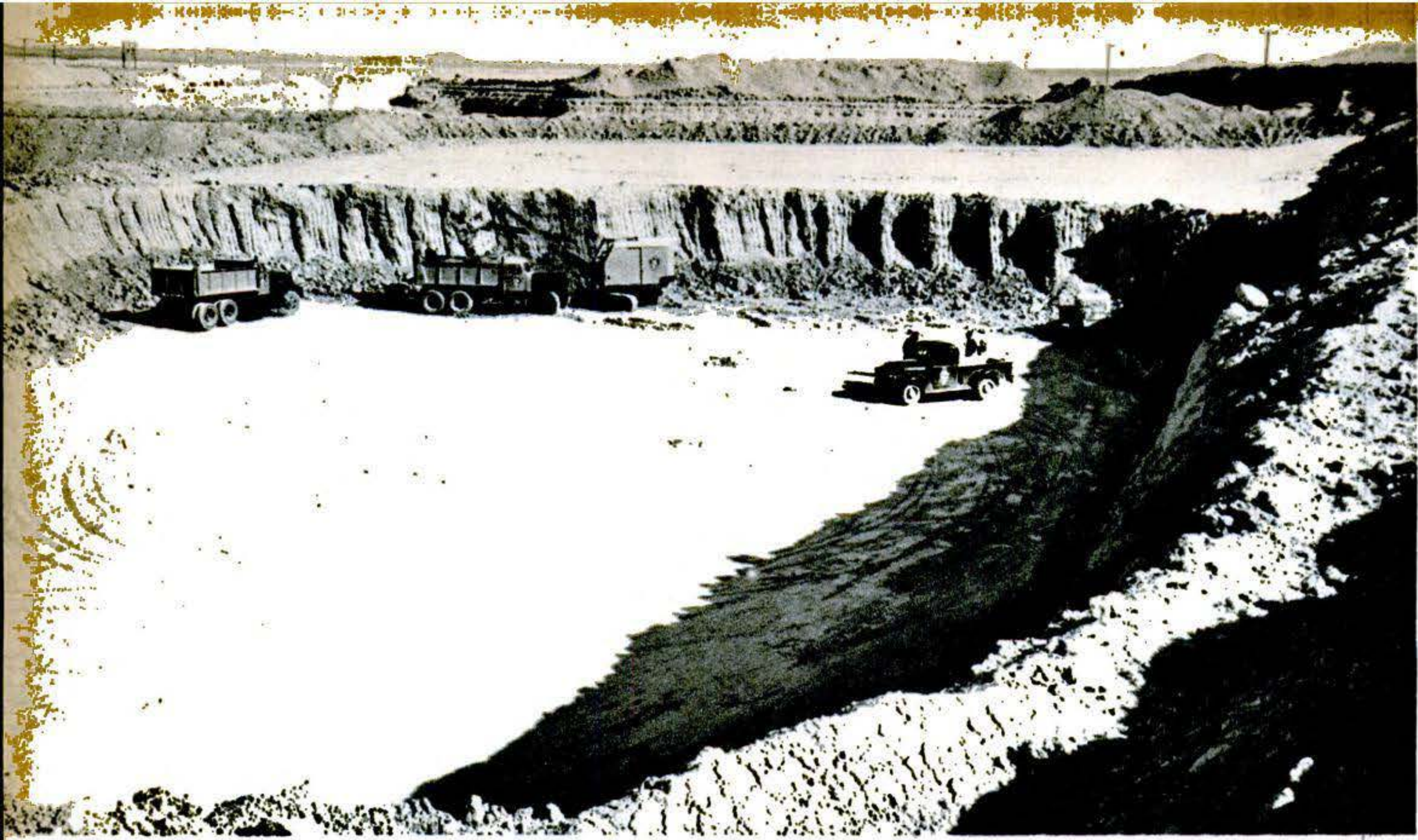
THE bearded prospectors who shuffled painfully across Rogers Dry Lake in the Mojave Desert years ago were heading toward gold in the west. But at every searing step they were literally walking on riches. Not gold but—MUD.

The rigs that drill into the earth seeking oil must be lubricated to keep the bit cool, to float off the rock cuttings the bit gouges away (PSM, Dec. 31, p. 20), to "plaster" the shaft so it won't cave in, and to hold down gas or oil that might "blow out" the well by pressure. Most efficacious single substance to perform all four chores is mud —a special kind of mud. The clay that forms the concrete-hard surface of Rogers Dry Lake makes just that kind of mud. It holds water well when mixed. It jells to the required smooth consistency, is not too salty or acid or alkaline. It doesn't contain too much sand. It doesn't set so hard that mud pumps can't break it loose and liquefy it again.

Often a stabilizing agent—caustic soda,

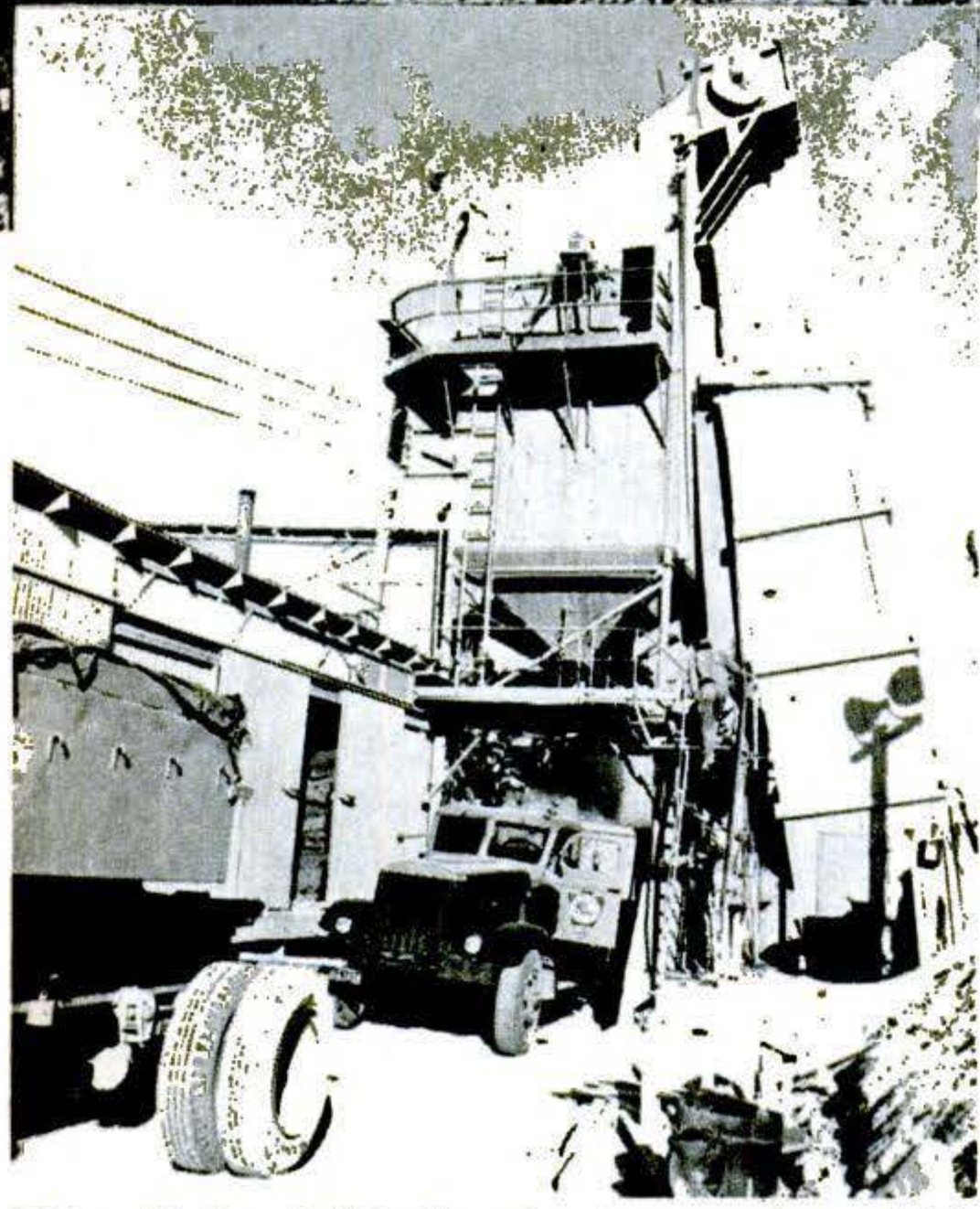


Copyrighted material



Power shovels bite into the subsurface of Rogers Dry Lake in California's Mojave Desert to dig out the tough, dry clay that makes oil-drilling mud. A fleet of heavy-duty trucks take it to be processed.

When it arrives at the spreading area, the newly mined clay is mostly in sizable leather-hard chunks. After sunning, airing, and disking, it is ready for the final milling.



This mill then hoists the clay to a crusher, which breaks it down into powder resembling greenish-yellow flour. Trucks load it in bulk for delivery to wells within 250 miles. Otherwise clay is sacked.

tannic acid, sodium phosphate—is used. The mud is pumped into the shaft at rates up to 900 gallons a minute. As it completes its journey, sometimes miles into the earth, the cuttings it then carries are separated by gravity or screening, and most of each gallon of mud is recycled—pumped through the circuit again and again.

The Mojave Corporation began prospecting Rogers Dry Lake in 1924. Cross lines were drawn on the nearly impregnable surface every quarter mile of its 25 by 6 miles. Samples of clay were taken every foot down. One day the foreman reported to General Manager Fay Lindbergh that he had found clay so hard to break up that he had difficulty filling a sample bag.

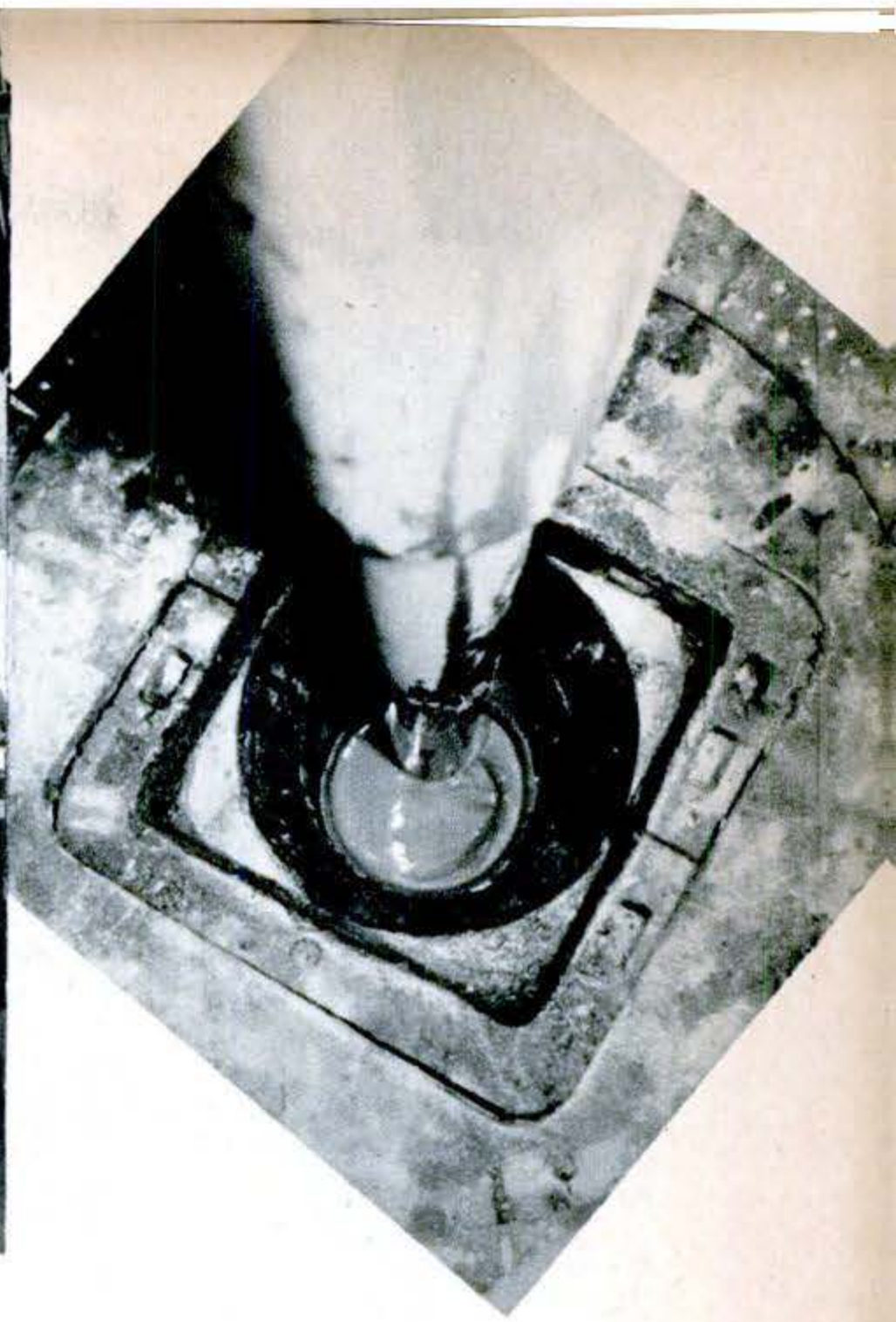
"We'd found a mud that was really thirsty," says Lindbergh, "and the way it hung onto water was hard to believe." The new mud lost only 4½ cubic centimeters of water in a standard test. Average muds lose as much as 50.

Here was the mud that would minimize



Copyrighted material

Under high pressure, the liquid mud is pumped through hose, shown looped at center right, into the rotating drill pipe. The mud goes down the pipe, spurts out at the bottom, cools off, and cleans the bit. Then it returns outside of the pipe.



Looking into mouth of a White County, Illinois, oil well. The rotary drilling pipe is shown in the mud-filled hole.

the driller's greatest hazards. First, there's stuck pipe. When thousands of feet of jointed pipe, to the bottom end of which is attached the drilling bit, get stuck, it takes hours, days, sometimes weeks to pull them out, rejoint them, and put them down again. Then there's cave-in. When the earth surrounding the shaft caves in, drilling is delayed. Finally, blowout. Gas or oil under greater pressure than the mud holding it down will blow up through the shaft or out through the sides. Any one of the three mishaps means heavy financial loss.

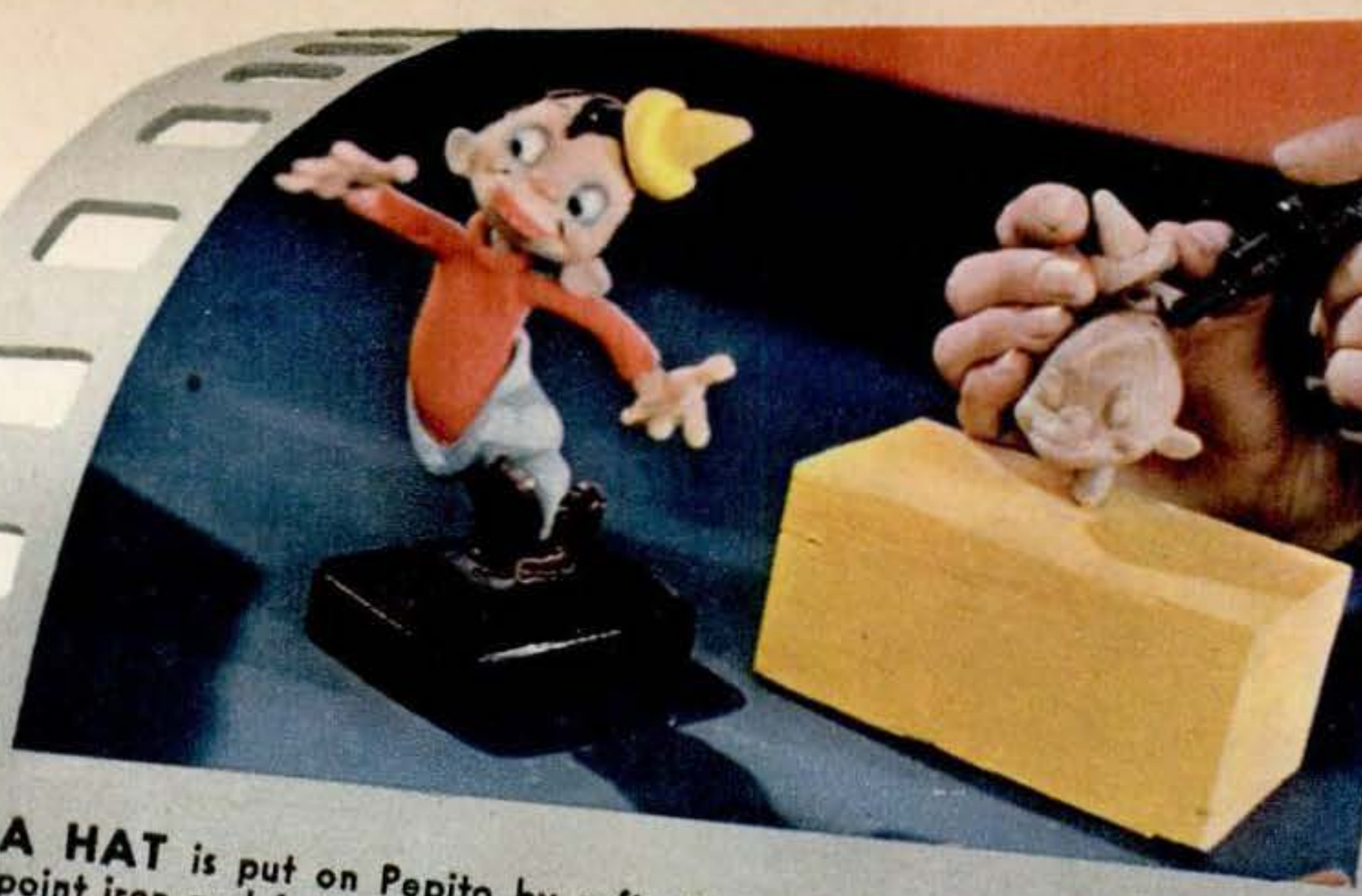
Particles of Lindbergh's mud are as small as four one hundred millionths of an inch thick. They assume electrical charges in water, with negative charges predominating on their surfaces. They repel each other, causing them to develop a "community" thirst. By chemical control, engineers regulate the degree of "jell" so that the liquid mud can suspend weight material for creating extraordinary hydrostatic pressures to restrain gas pressures deep in the earth.

The newly mined clay is hauled to a spreading ground near by, where it is sunned, aired, and repeatedly disked. When it is reduced to small clods, scrapers drag loads across a hopper where the mill hoists it to a high-speed crusher. The clay emerges from the crusher as a fine powder at the rate of a ton a minute.

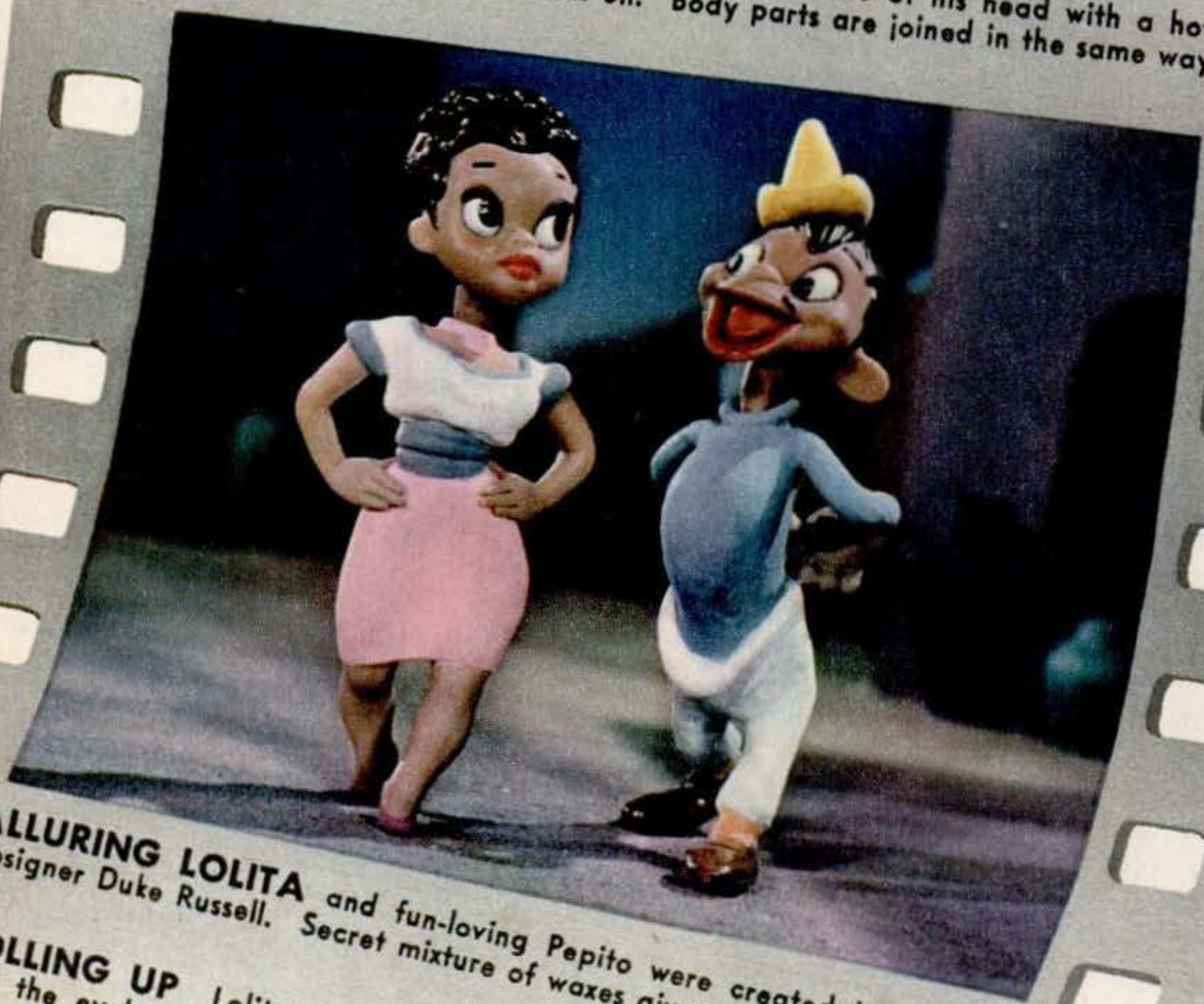
The corporation's trucks travel 50,000 miles a month delivering mud. To rescue wells in trouble, a dozen trucks sometimes shuttle day and night. Last year 100,000 tons of dry mud, worth $3 a ton in bulk or up to $10 a ton sacked and delivered, was produced by Mojave.

That's real "pay dirt."

Without the right mud to hold it down, the gas pressure in a drilling well can blow out and cause damaging fires like this one at the Signal Hill field in Los Angeles County, California.



**A HAT** is put on Pepito by softening surface of his head with a hot-point iron and fusing the hat on. Body parts are joined in the same way.



**ALLURING LOLITA** and fun-loving Pepito were created by model-designer Duke Russell. Secret mixture of waxes gives natural-skin texture.

**DOLLING UP** Lolita. For close-ups, an oversize head is used so that the eyebrows and eyelashes can be handled easily by the artist.

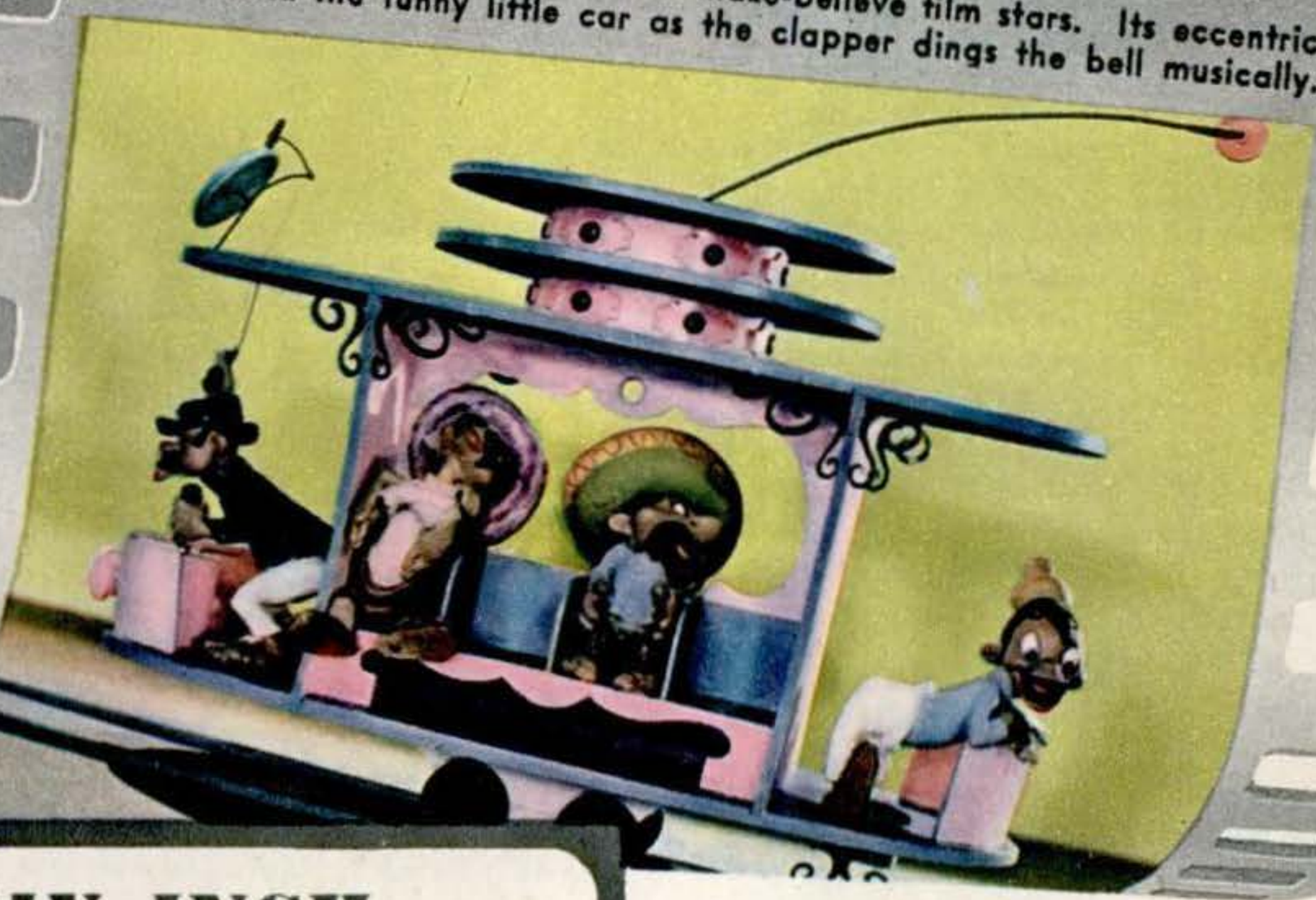
*Photographs by*
*BOB NEWMAN*

**SERENADE** by Pepito. Four of the 10 positions needed to film a single stroke on guitar.

Copyrighted material

**PEPITO AND LOLITA,** new plastic stars of the cartoon movies, take a leisurely stroll down the street of a modernistic village in Mexico.

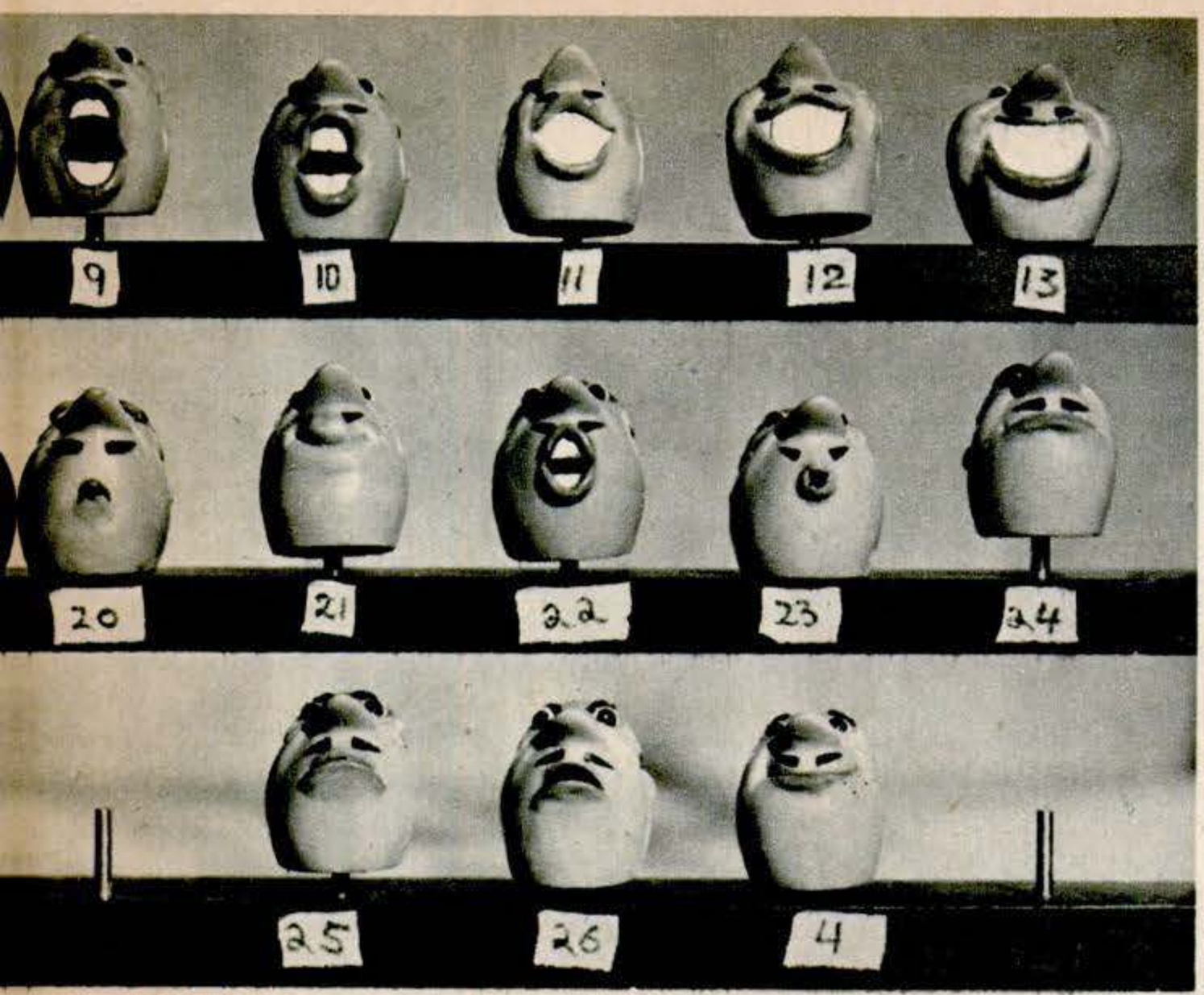
**BOUNCING TROLLEY** carries make-believe film stars. Its eccentric wheels rock the funny little car as the clapper dings the bell musically.



# SIX-INCH Wax Dolls ARE NEW STARS IN FILMLAND

PLASTIC cartoon figures that smile, strut, hop about or dance with joy, and can appear surprised, terrified, bored, or disgusted have given animated films a new three-dimensional look.

The "stars" of the new movie clan are Lolita and Pepito, each of whom has more than 100 heads. In addition, hundreds of hands, arms, legs, and feet are kept in readiness, for each change in body movement




**HEADS,** such as these of a waiter who is in the supporting cast of Lolita and Pepito, are kept near at hand. The director selects those needed to achieve an effect and orders by number.

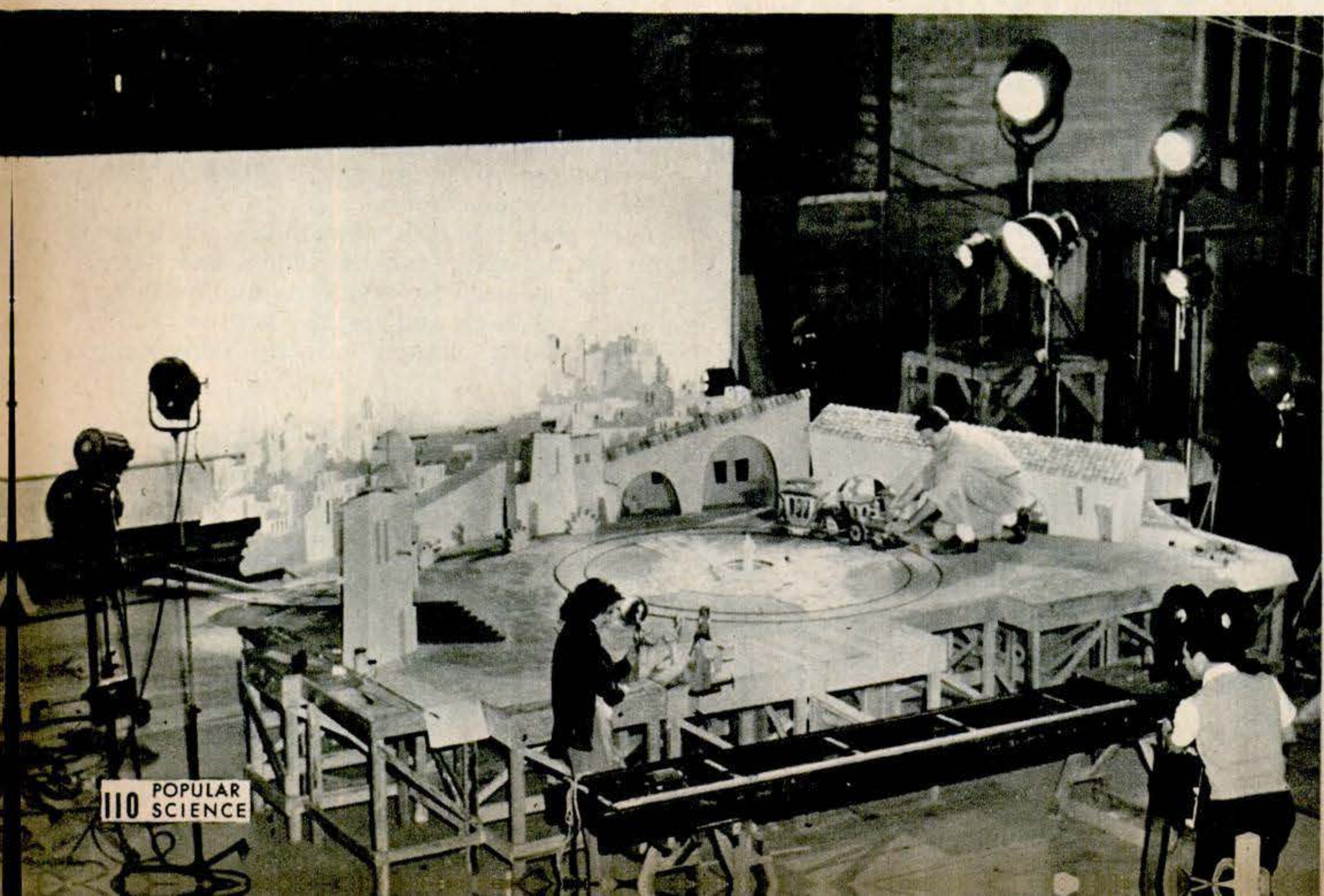
requires several individual parts to express the action. Only six inches tall, these dolls are moved around on miniature sets like those built for model railroads.

Pictures are filmed frame by frame, often with a new body position for each succeeding frame. Each figure assumes eight poses for one step forward, and is held in position by a steel pin that penetrates the floor of the set. As many as 50,000 changes of parts may be required for the 10,400 frames necessary to make a 650-foot picture that runs 10 minutes. Several score artists, animators, wax workers, set builders, and camera operators are needed to move the cast of characters through a scene.

Larry Morey and John Sutherland, of Los Angeles, producers of the plastic cartoons, make their performers out of a combination of several waxes. Body parts are formed by pouring the mixture, at a temperature of 180 degrees, F., into tiny plastic molds. Two hours later they are ready to be worked into the desired shapes and forms that make them look like real people.

The hardened wax looks so much like human skin that it doesn't have to be painted, but lips, hair, cheeks, eyebrows, and eyelashes, of course, must be added. Eight parts form each performer's body: head, neck, torso, hips, two arms, and two legs. Removable hands sometimes are used, especially in close-ups when characters must move fingers or clench fists.

**SETS** are constructed with the same care given those for major productions. Built on a diminishing scale, they present an appearance of added size and depth to the Technicolor camera at the lower right. Paper animators make flat-surface action drawings that are used as a script in guiding technicians and prop men.





Copyrighted material

# I'D LIKE TO SEE THEM MAKE...

**Everybody has his own pet idea of some gadget he would like to see in general use. What is YOURS? Popular Science Monthly will pay five dollars for every such suggestion published.**

**A "bizzy buzz"** to notify the person receiving a telephone call that someone else wants to talk to him. Maybe, says ideaman Dr. Frank Victor, Kew Gardens, N. Y., there could be a return signal saying, in effect, "Try again a little later."

**Battery-heated blankets** for the use of spectators at football games or other cold-weather outdoor activities. Thus far, electrically heated blankets have been designed for house current. The idea was suggested by Pat Mullane, Kansas City, Mo.

**Embarrassment saver** for railroad coaches. Outside of every toilet would have lock-controlled red and green lights to indicate whether the space is occupied or vacant. Idea by A. H. Stevens, Jr., Clinton, Conn.

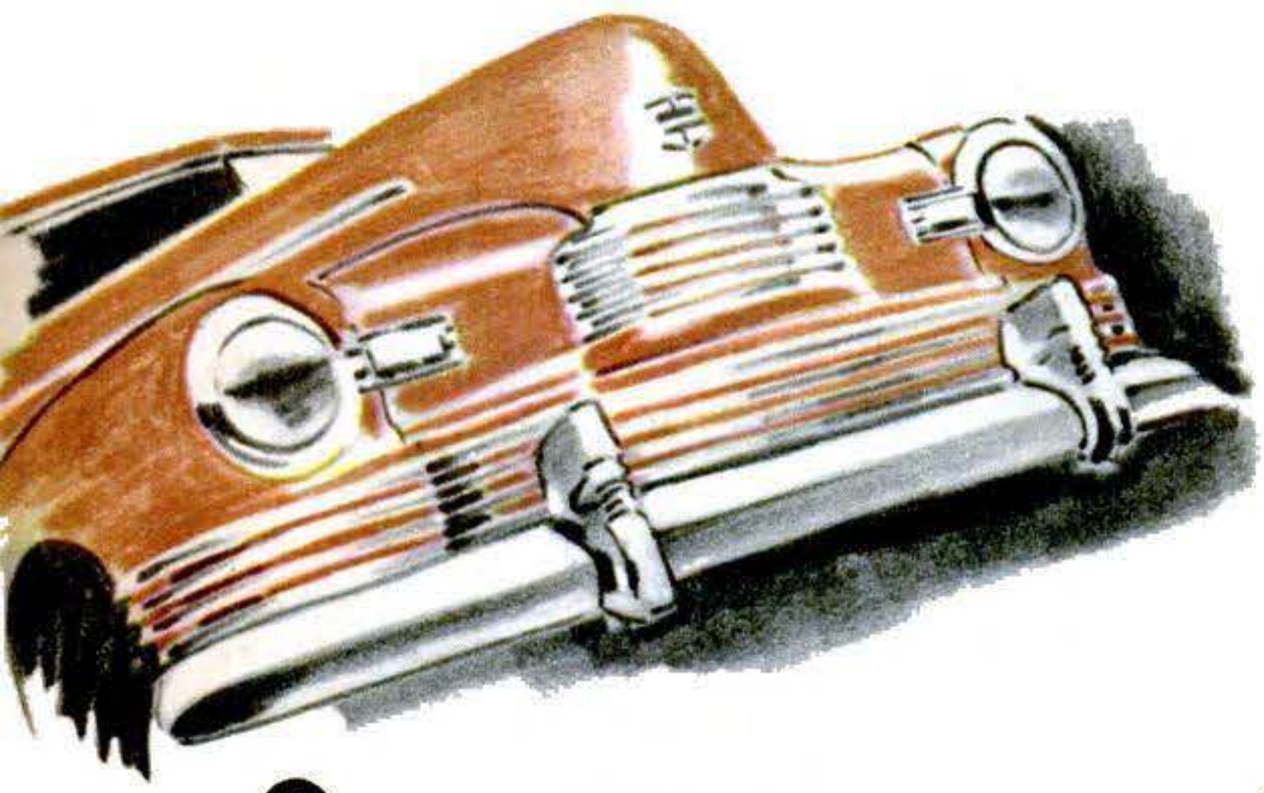
**Dripless gravy spoon.** You could dip gravy from the dish across the table and bring it over to your potatoes without drooling a brown streak to your plate. Staff Sergeant Franklin O. McCombs, Bay St. Louis, Miss., suggested it.

**Convertible outboard motor.** It could be lifted off a boat and clamped on the back of a scooter for land travel between bodies of water. Carl Gran, of Chicago, allows that water cooling is not wholly practical on a scooter and that it is not advisable to remove the propeller. He says, however, that a clutch or spline on the vertical shaft could be made to fit snugly into the drive on the scooter for quick, easy transportation to the next lake.

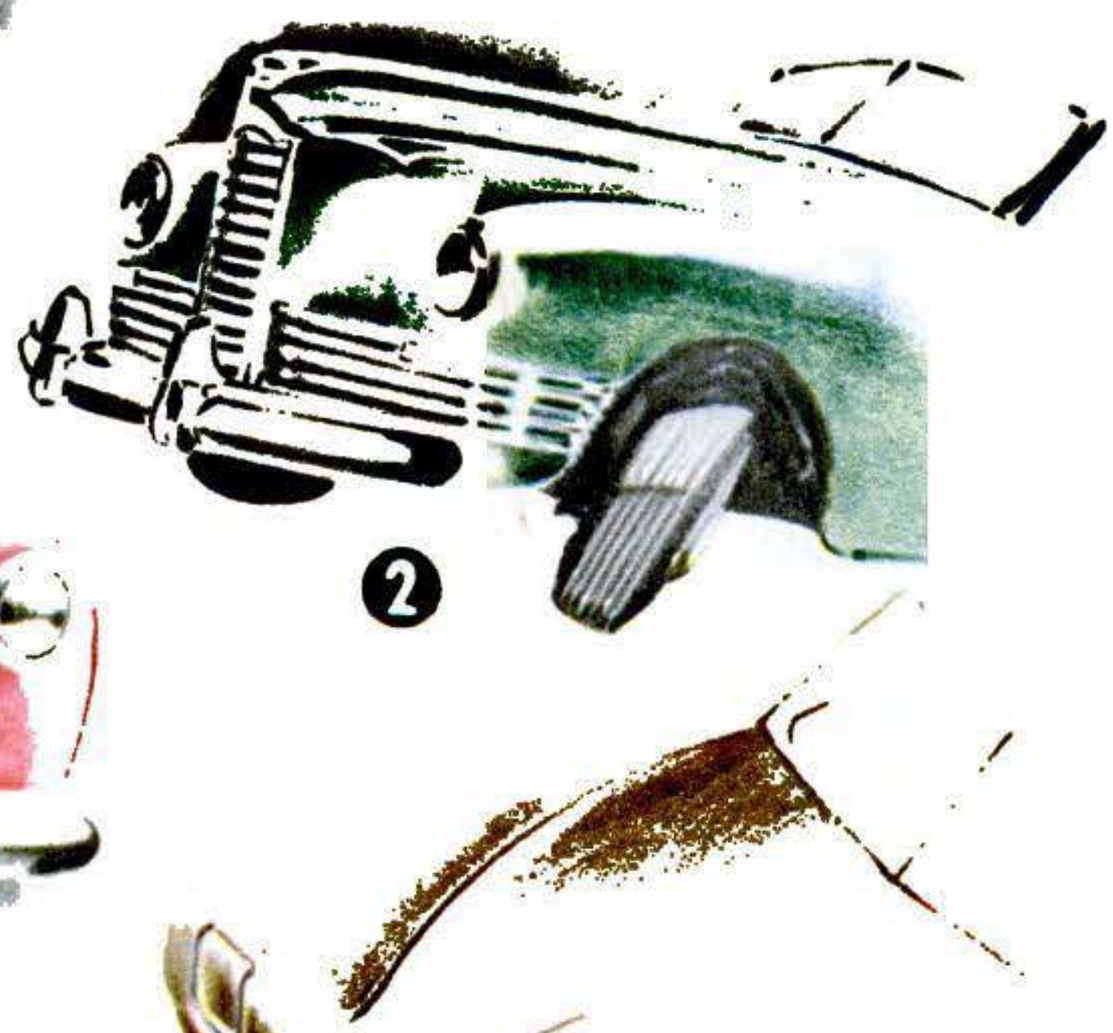
Copyrighted material

# DO YOU KNOW YOUR

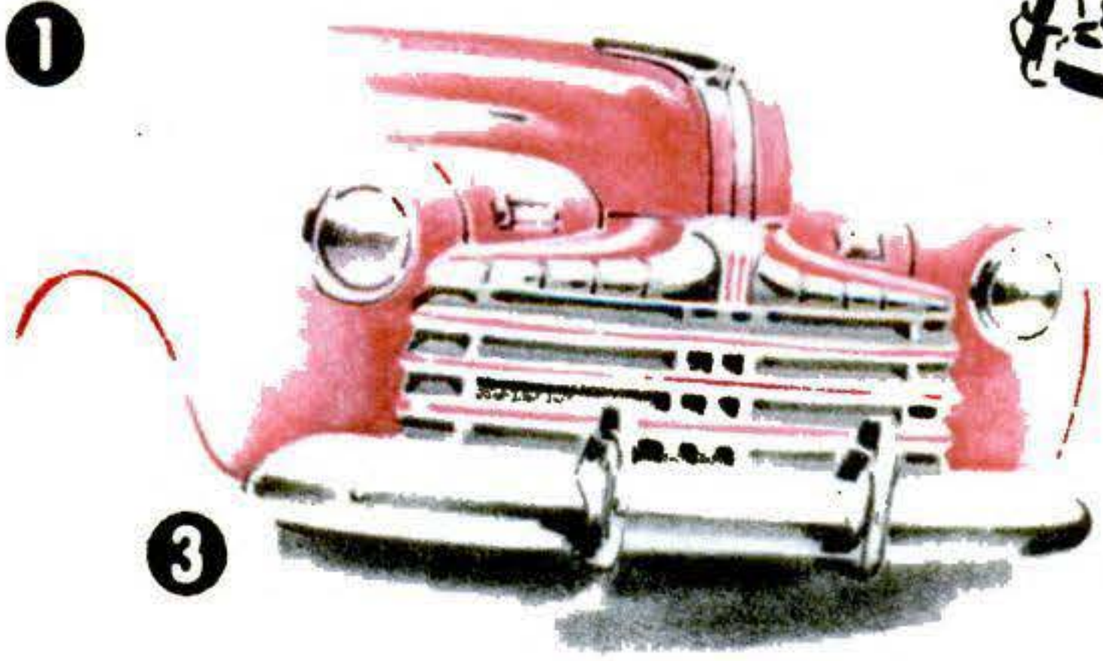
**Test yourself with these sketches by T. Madawick, industrial designer. They include distinguishing features of 11 models now on the road. Then turn to page 208**



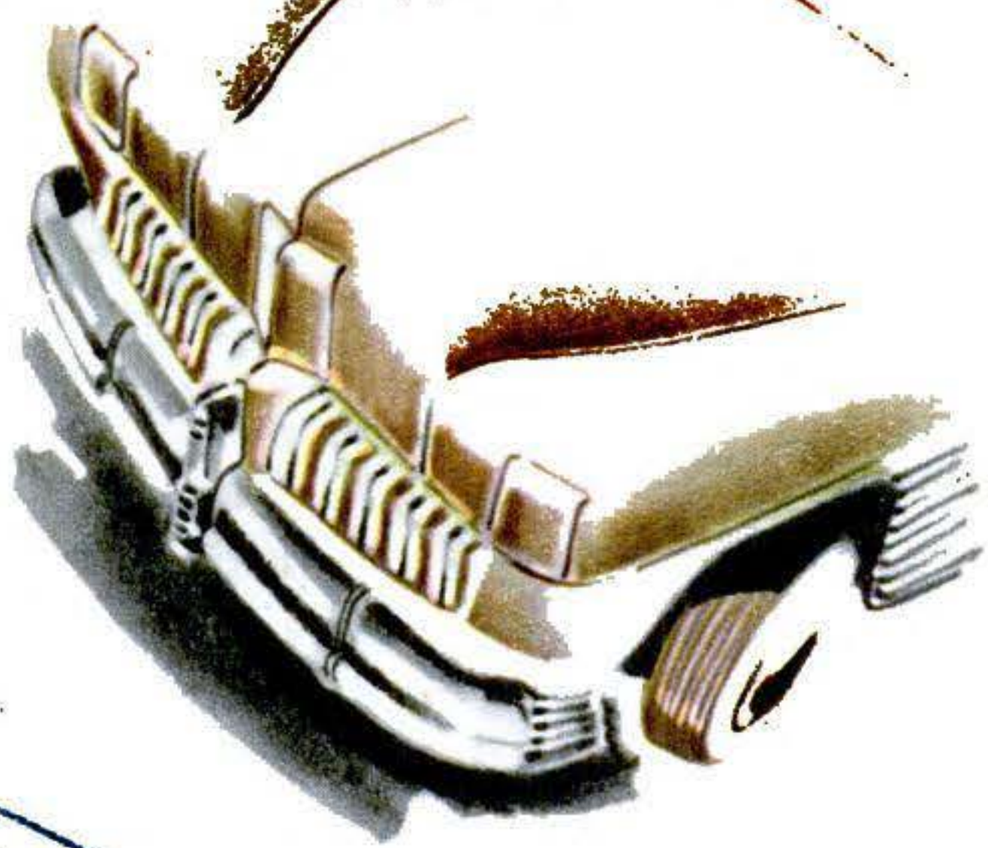
1



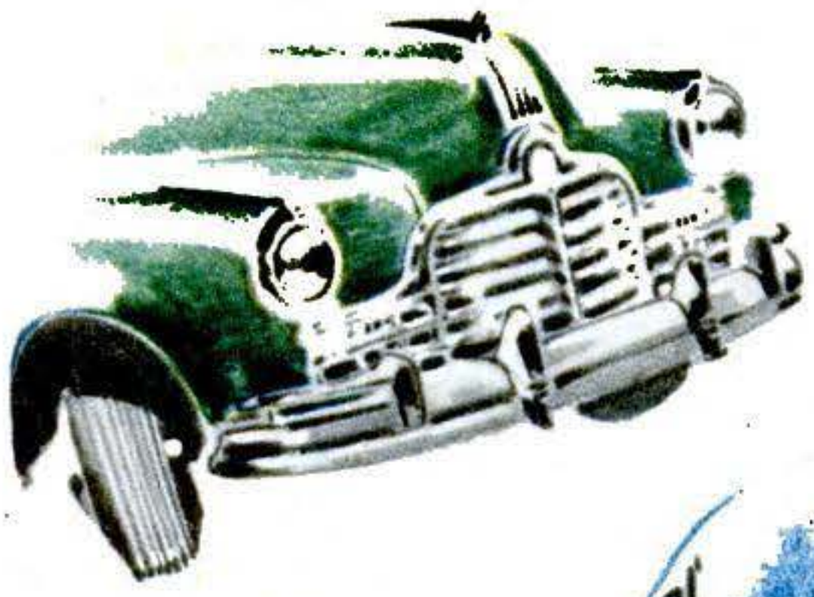
2



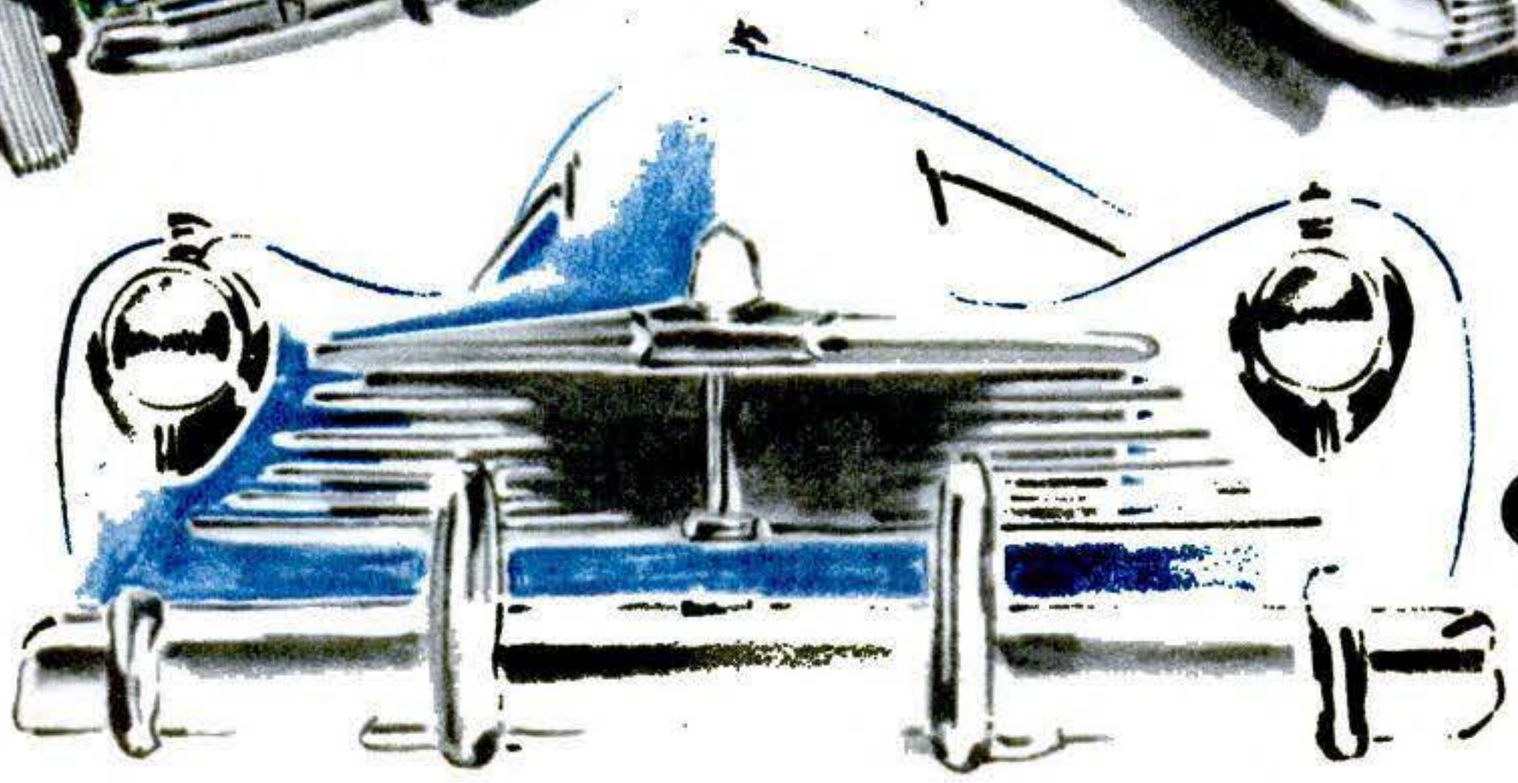
3



4



5



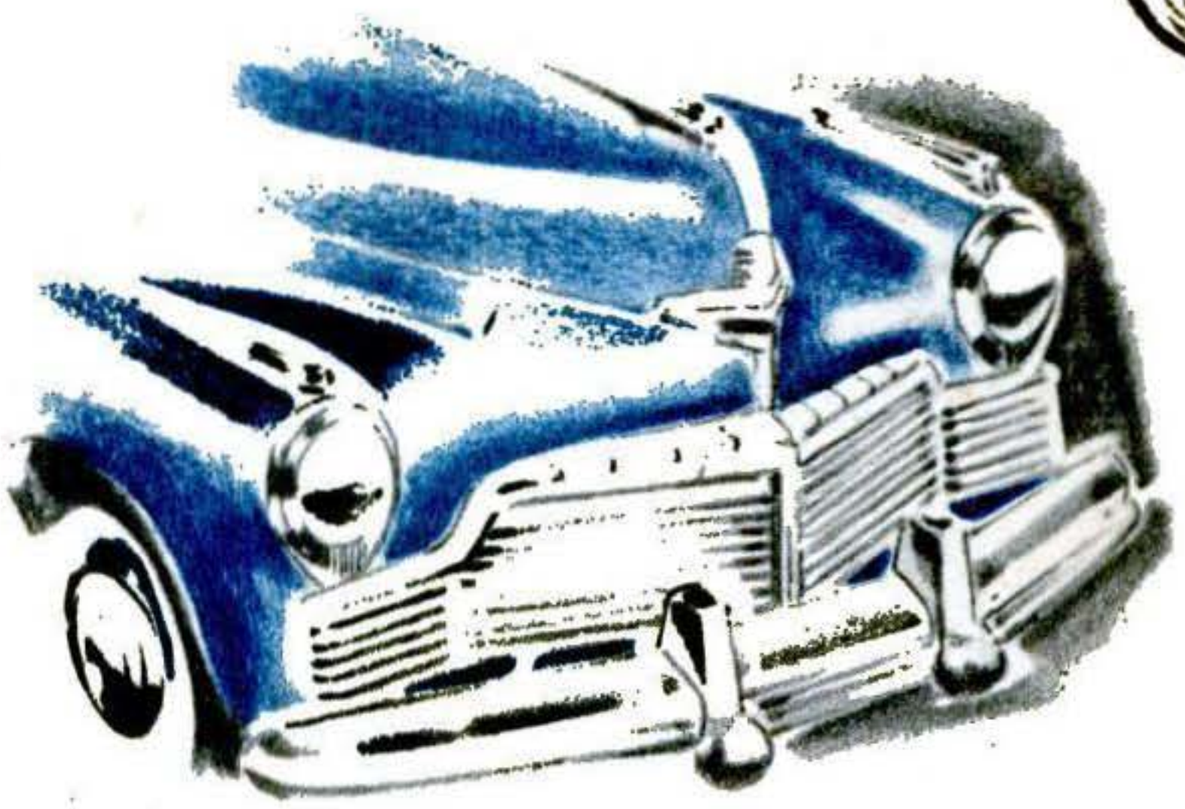
6



Copyrighted material

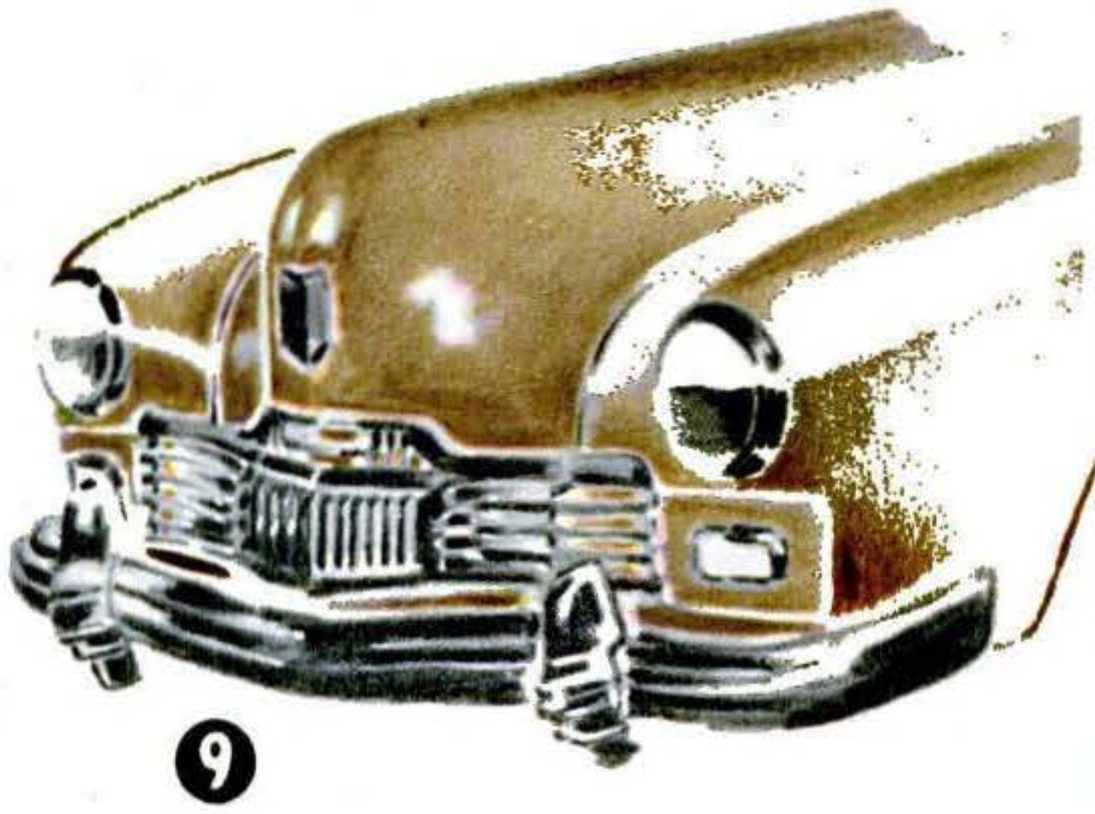
# 1946 CARS?

**for the correct answers, and give yourself 10 points for every one you got right. If your total score is 120, you ought to go to the *end* of that line of potential buyers.**

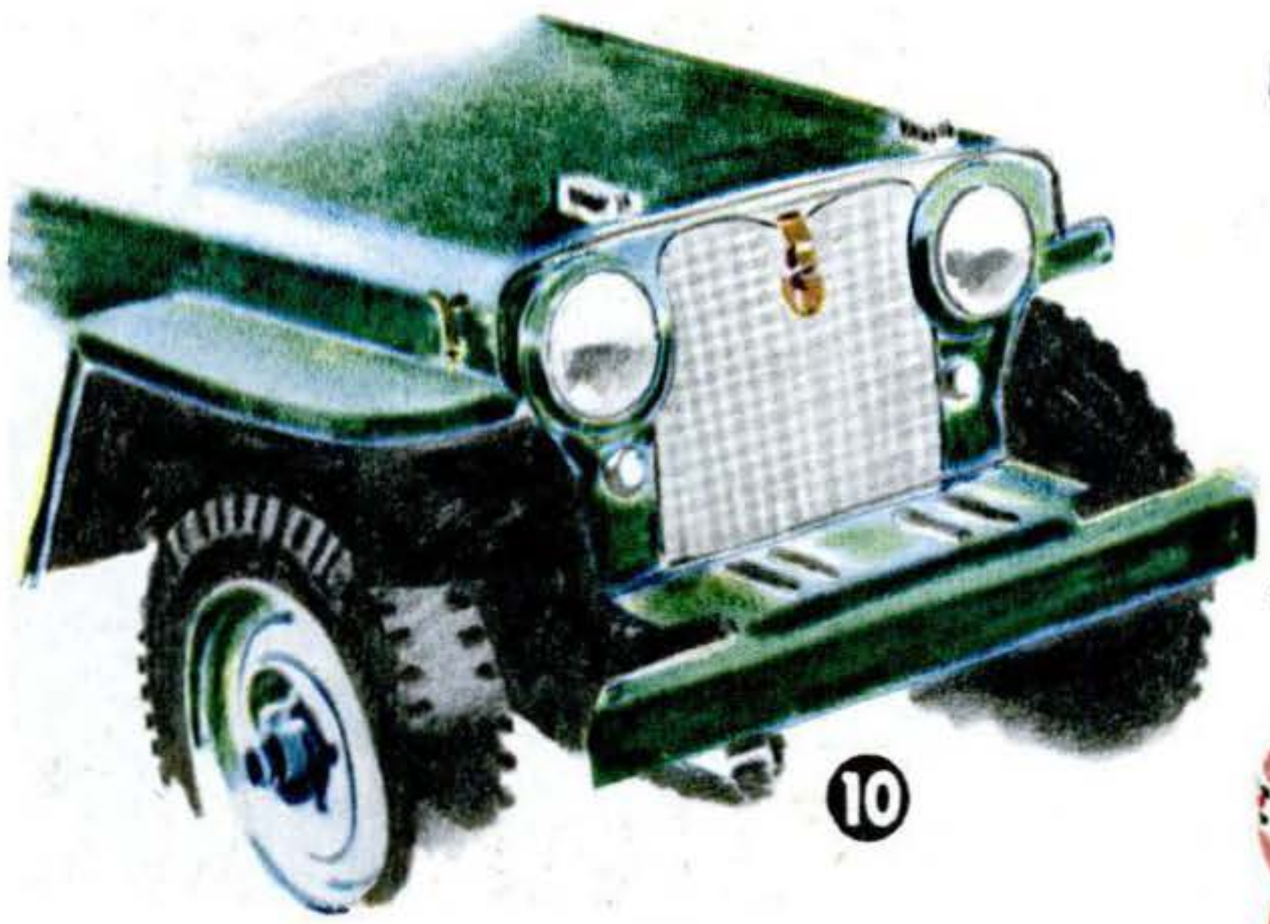


7

8

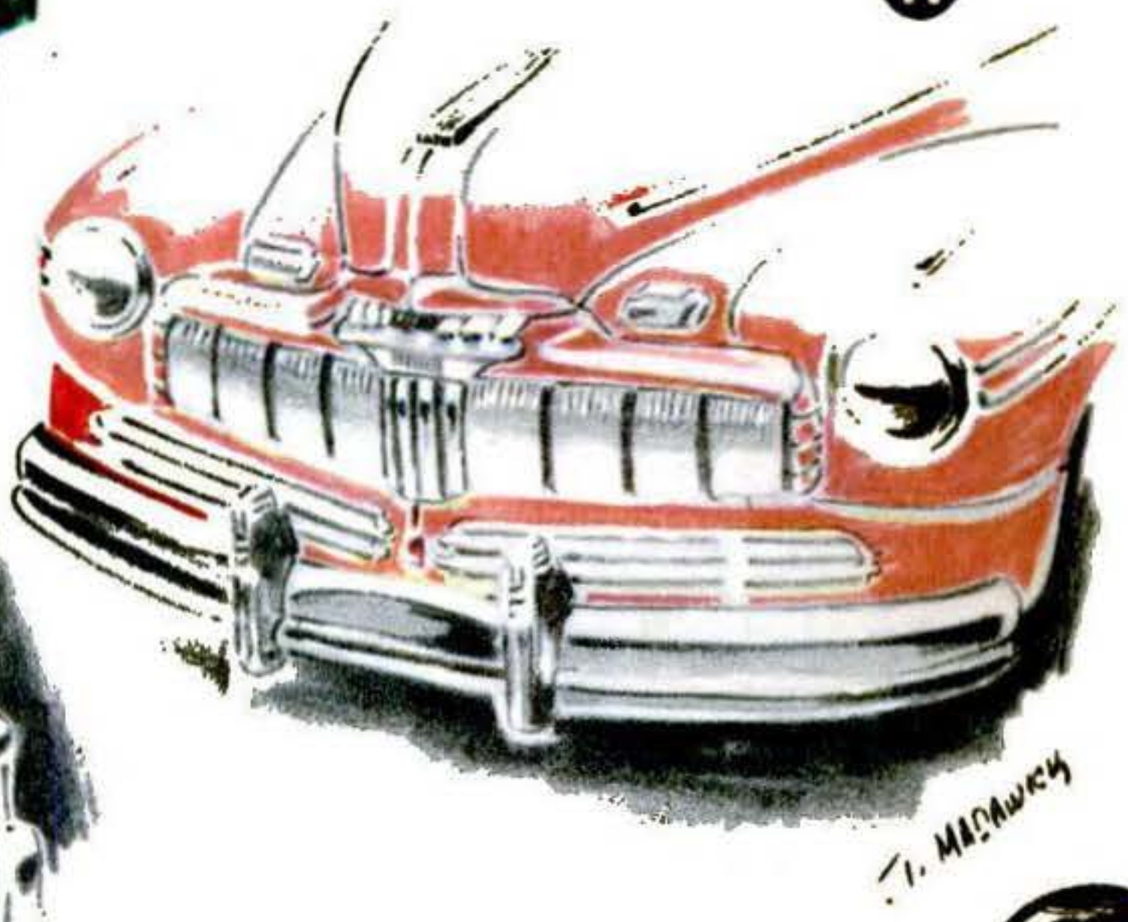


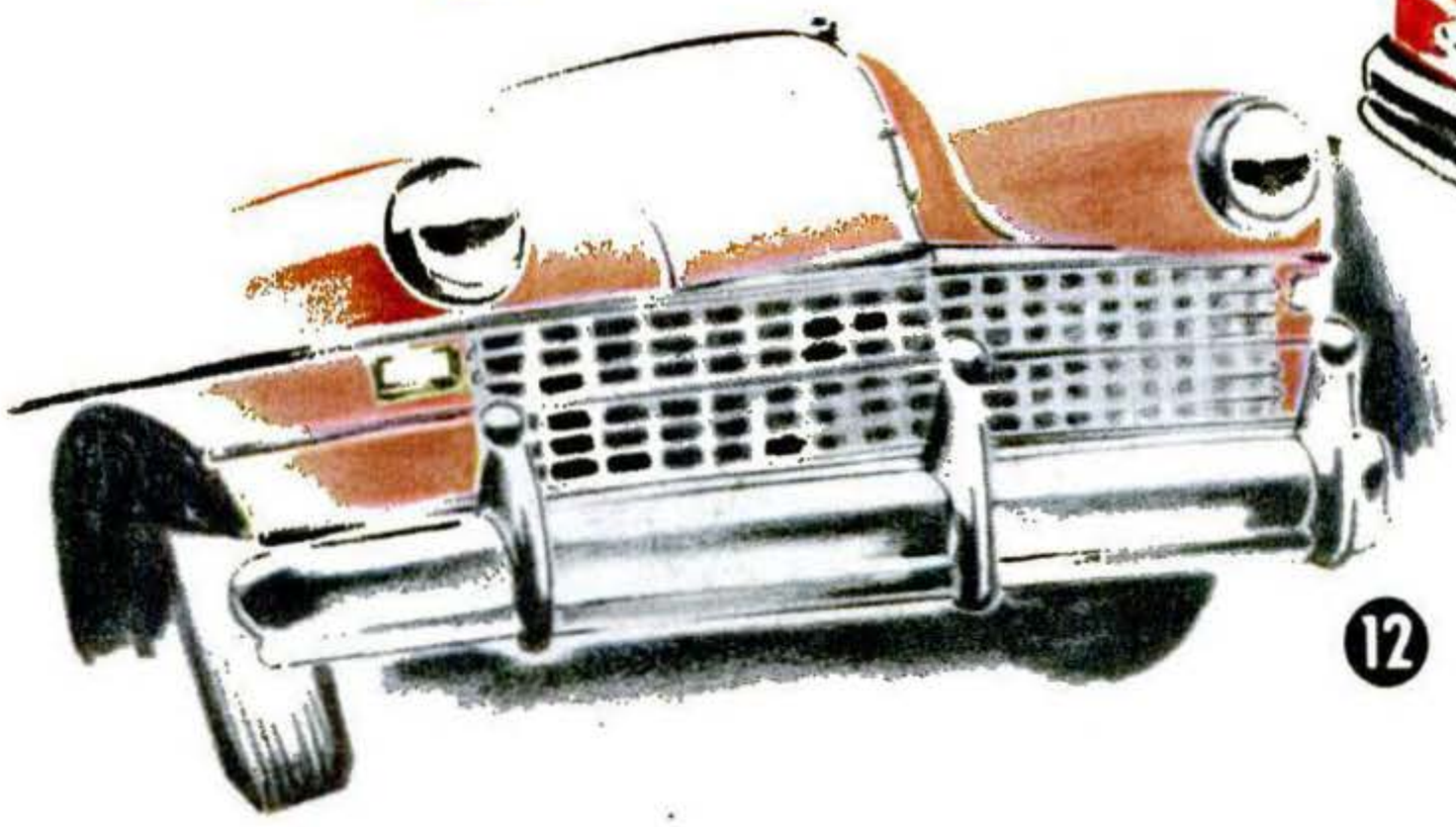
9



10

11





12

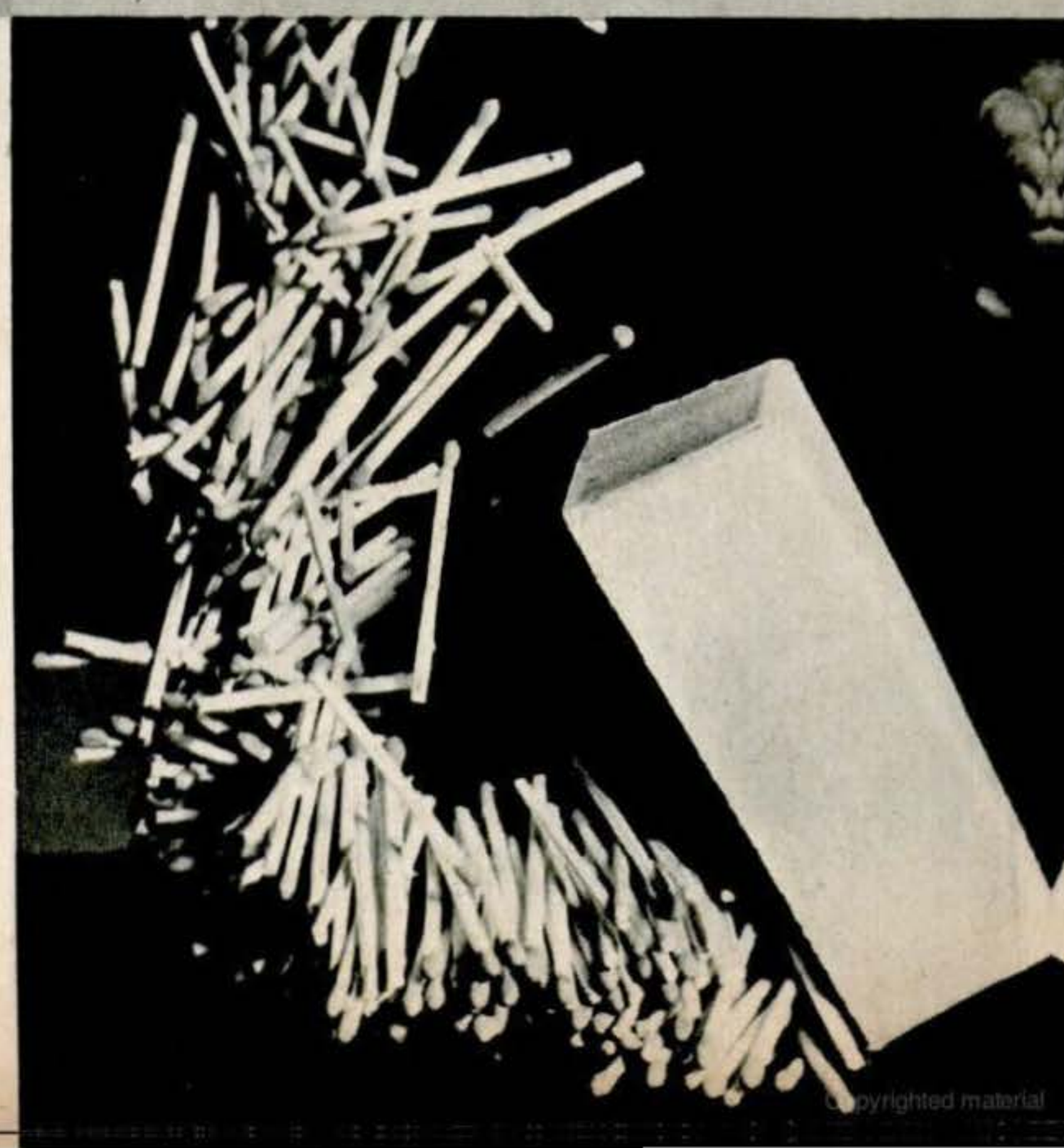


Copyrighted material

This is what happens when a milk bottle falls and breaks. Instead of bursting all at once, it smashes first at the impact point, then disintegrates upward.

# Flashes of

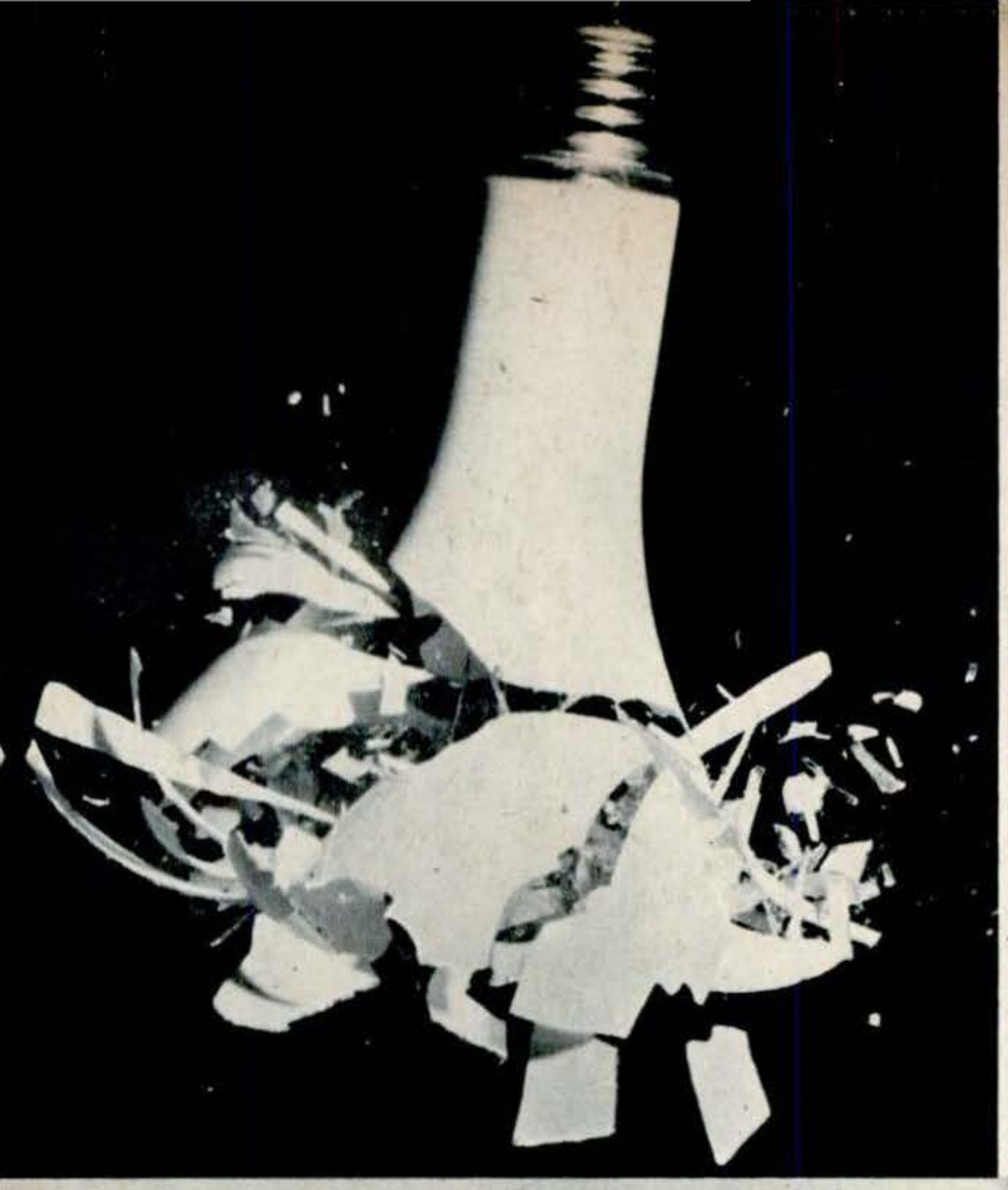
Matches took a disorderly tumble as one end of their box dropped faster than the other. Contrast in these photos was heightened by doubling development time.



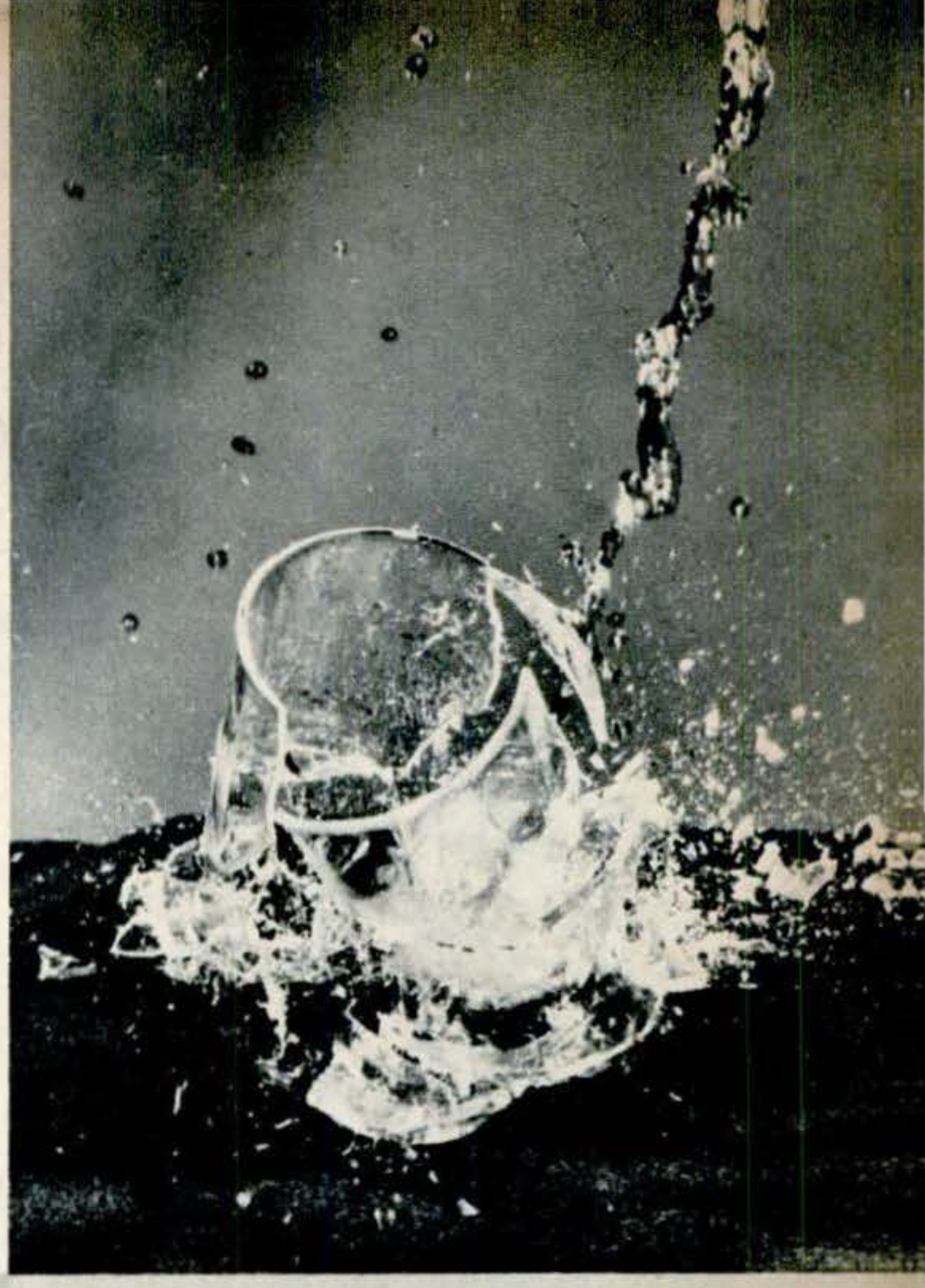
PHOTOGRAPHER David McLane, of New York, set out to see what happens when you drop something and it breaks. He balanced a lead target that closed an electrical circuit when struck, tripping the shutter on his 4x5 Speed Graphic and firing a Kodatron Portable Speedlamp. The lens, a five-inch f/4.7 Ektar, was open at f/22 for 1/100 of a second, but the real exposure time was that of the lamp's flash, 1/10,000 of a second. Its battery powers 200 flashes before it needs recharging. With vibrator converter, it delivers 2,000 volts D. C.



Copyrighted material



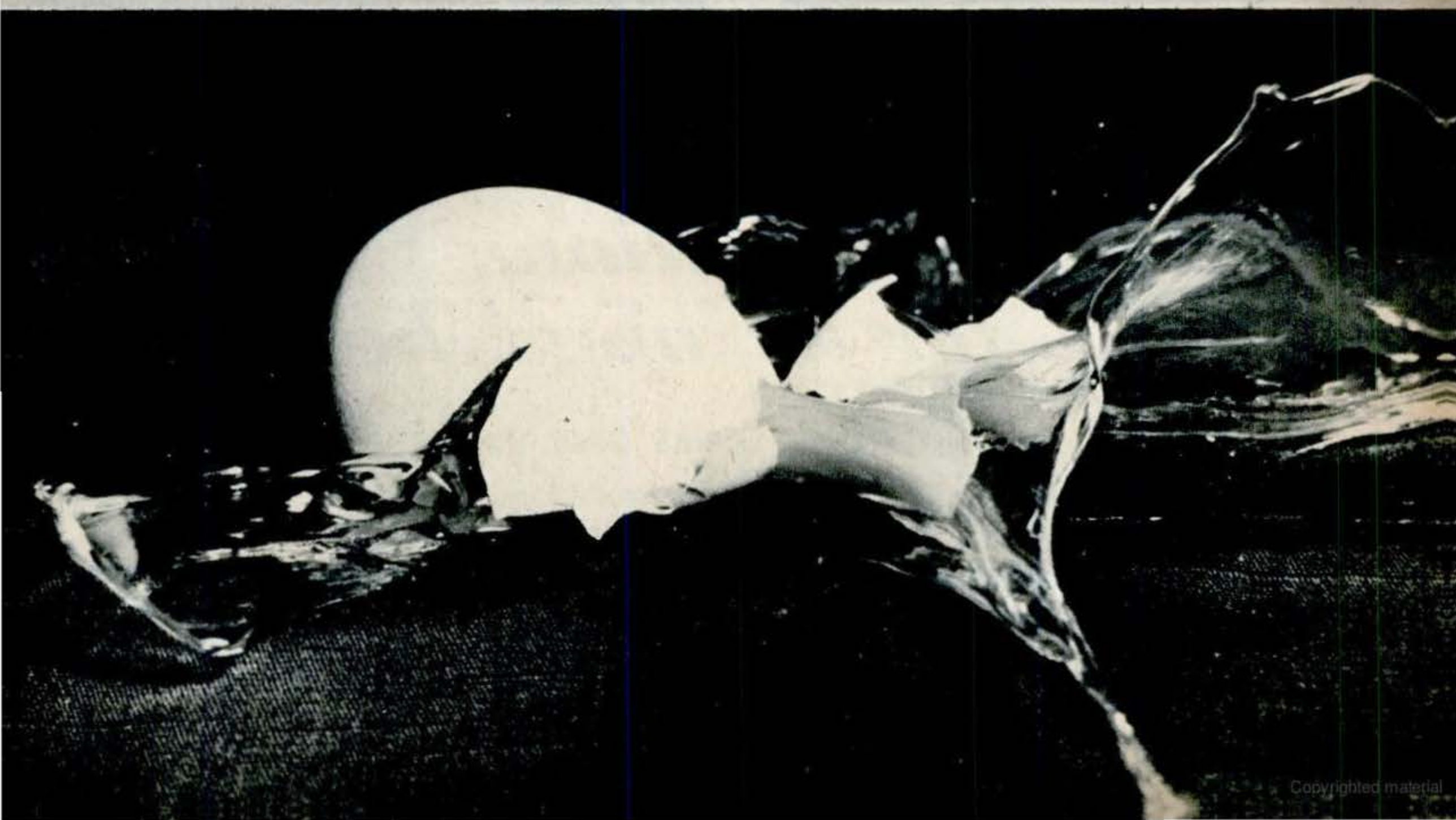
Dropped six times on the photographer's lead plate before it broke, this rare bulb then went to pieces just like the milk bottle. The lens caught it before the neck collapsed.



Is the ribbon of water spraying upward from the shattering glass or crashing downward? McLane thinks it slipped out on the way down and has not yet hit.

# Things Going to Smash

An egg breaks in two spurts. The clear glasslike sheet is the fast-spraying white. The yolk held together longer and is just beginning to fly out of the shattered shell. McLane at first tried to judge the instant of impact by eye alone, but quickly found this method was so inaccurate that he rigged up his hair-trigger switch.



Copyrighted material

Pennsylvania Dutch originals inspired both this chest and its decorations. As the first step in the stenciling process, the sketches are drawn on plain paper. Then the parts are transferred to the stencil paper with carbon paper, as below.

Materials needed for the job include stencil paper, a sharp knife, brushes, chalk, paint, thinner, and drier. A white dinner plate makes a good palette.

# Stencil Decorations for a Hope Chest

## DIFFERENT DESIGNS WITH ONE THEME GIVE HAND-PAINTED EFFECT

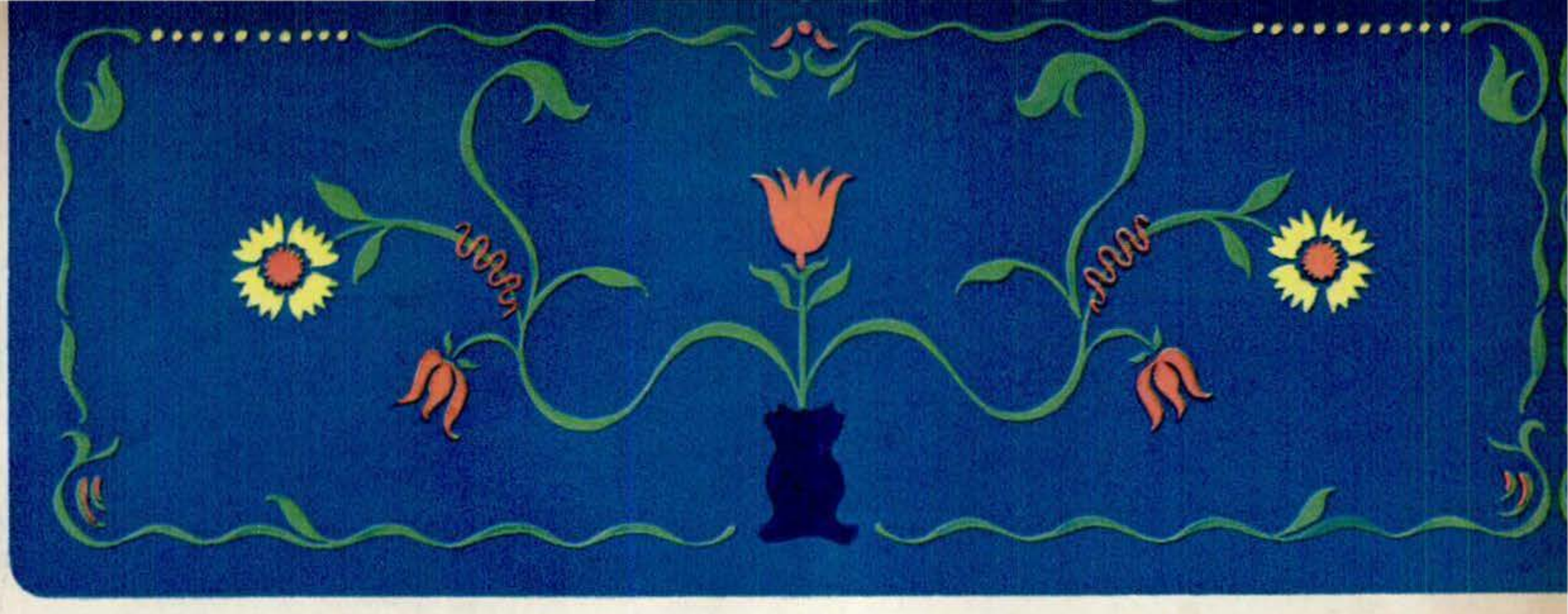
**By Joseph Aronson**

STENCILING is an ancient method of simplifying the reproduction of a decorative theme. By cutting the elements of the theme out as separate stencils and then combining them in different ways, a generous variety of related, but not quite identical, designs can be created.

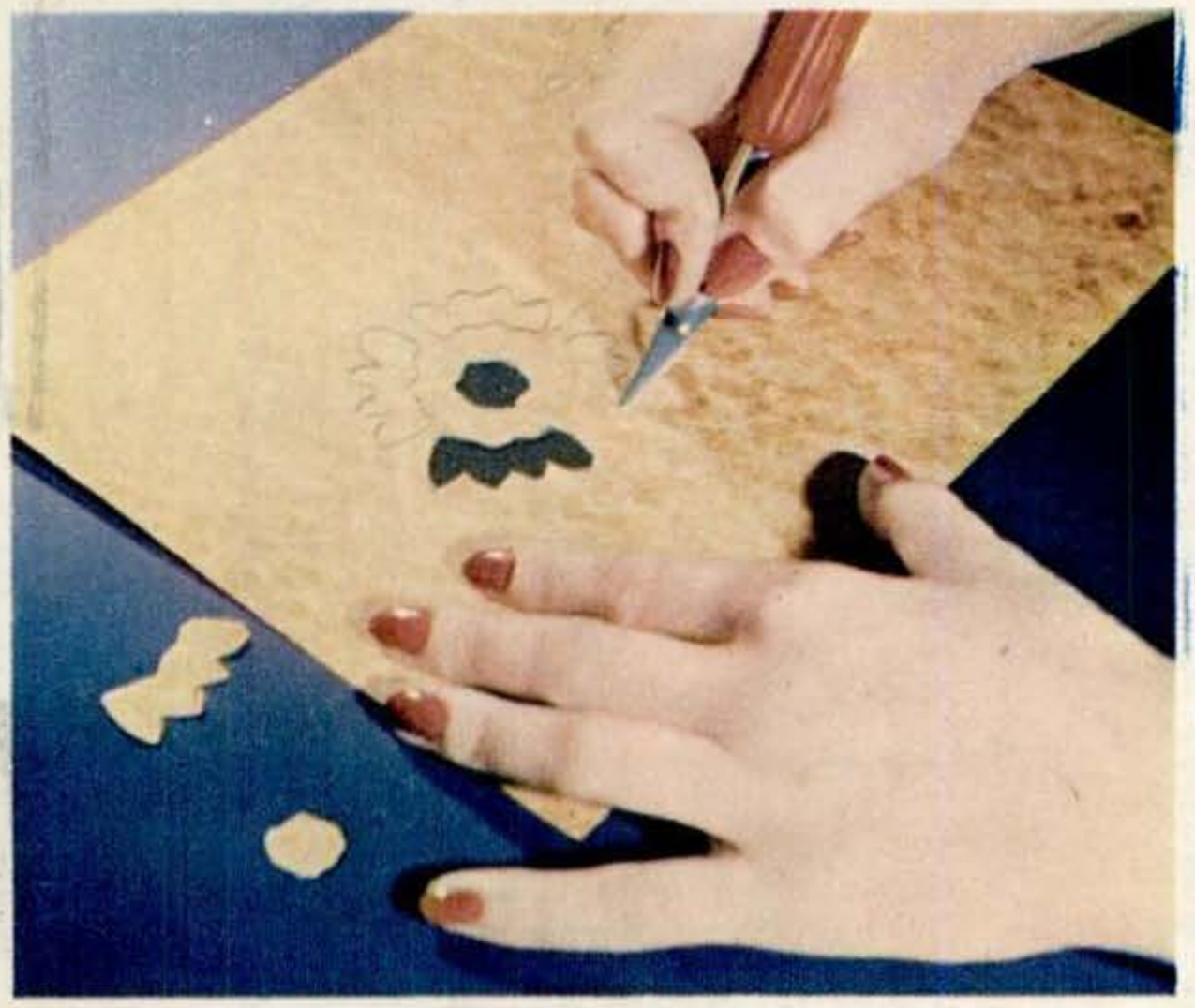
Decorations from Pennsylvania Dutch furniture are particularly suitable for the chest above, for its design also came from



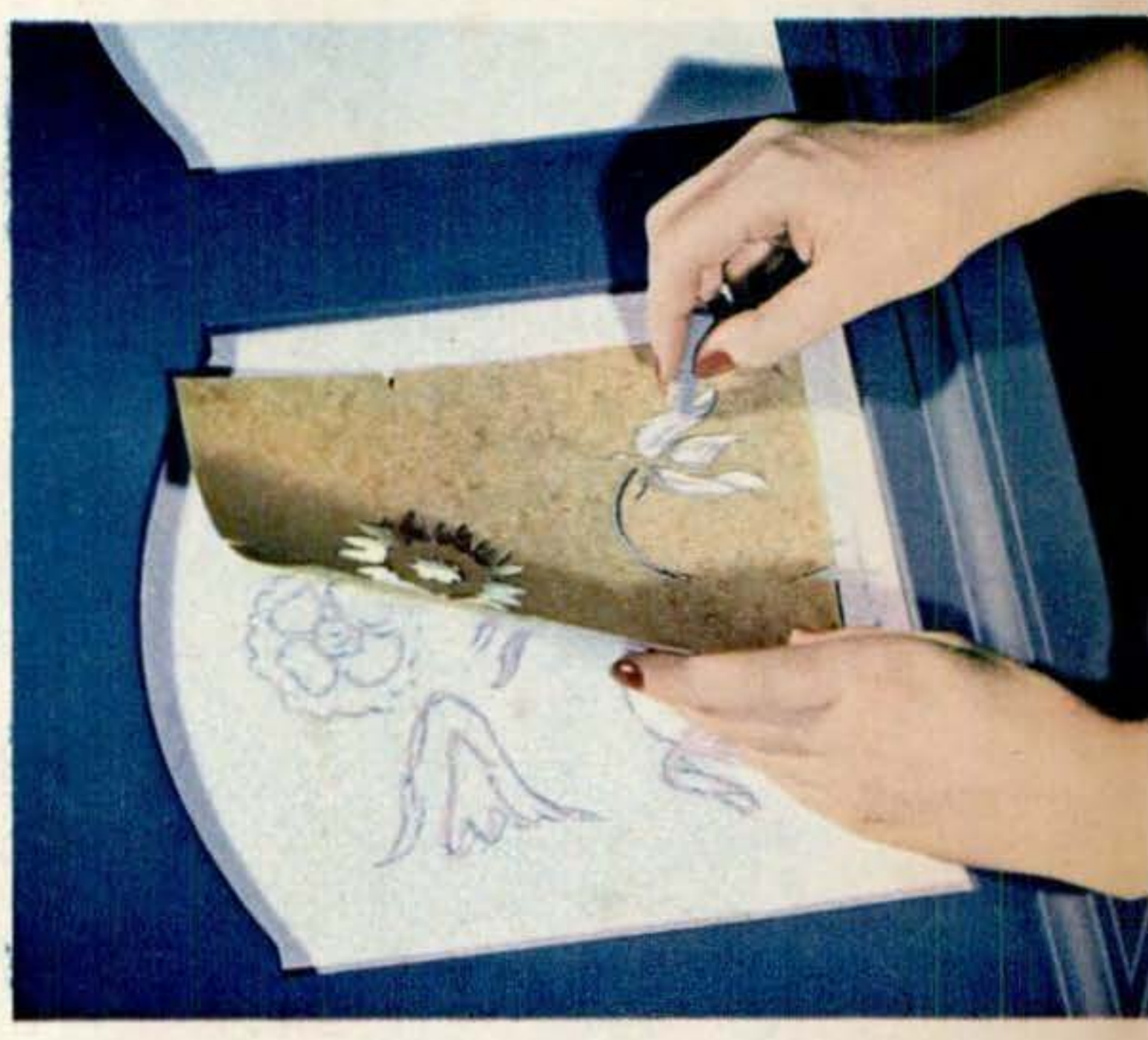
Copyrighted material



Symmetry and color harmony are features of this pleasing design. It is suggested for the top of the chest.



In cutting the stencil, a razor-sharp knife with a good grip is important. The easy sweeping cut that produces a flowing curve is a matter of practice.

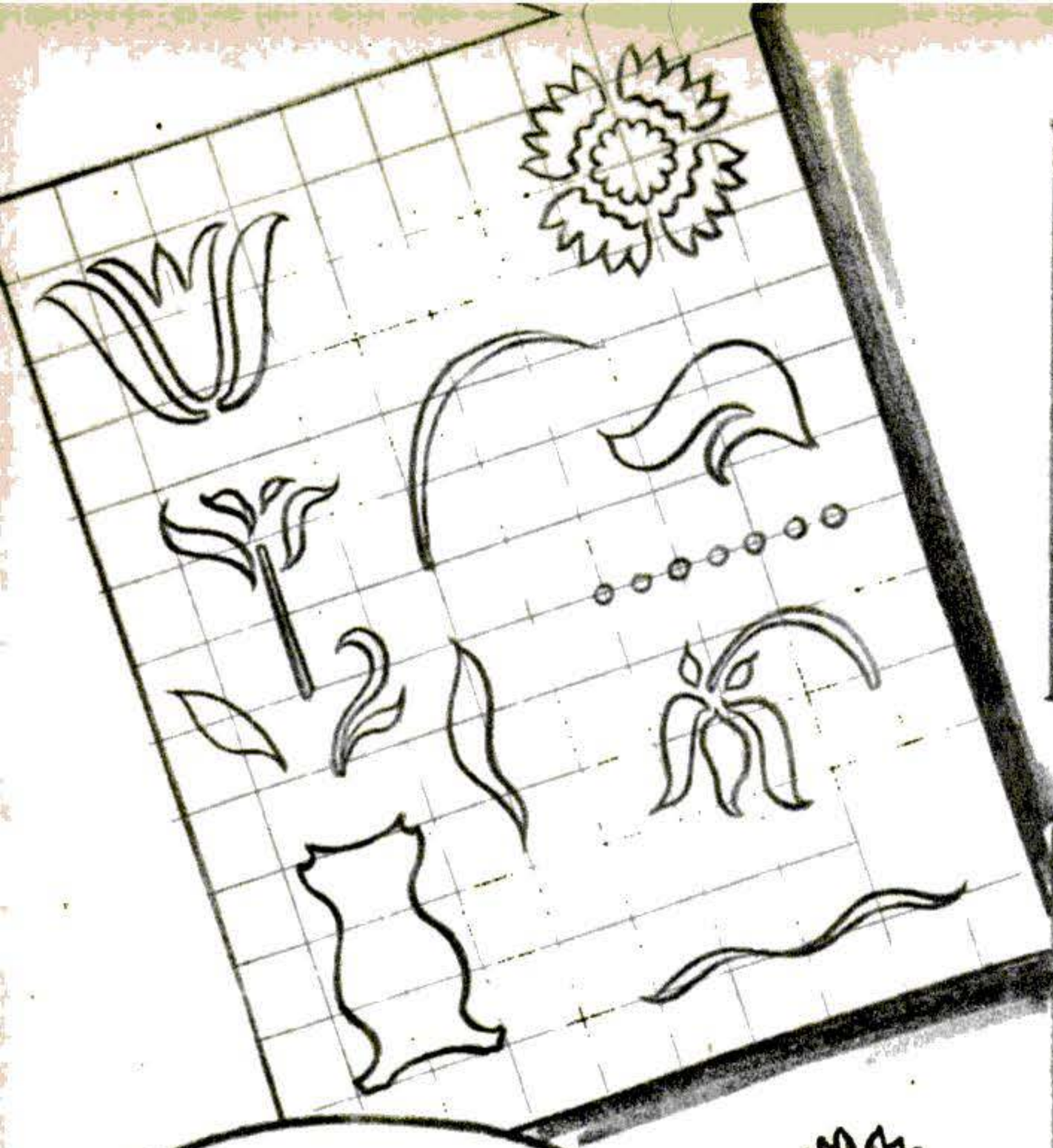


Each unit of the design is first transferred to the work with chalk so that changes can be made until the desired spacing and arrangement are obtained.

Paint is applied through the stencil with a light stamping motion, straight up and down. The paint must be thick. If thinned too much, it will flow.

Brush lines or light touches of shading colors help tie a design together. Your own skill with a brush will tell you how much of this touching up to risk.

Copyrighted material



**Variations of a single theme are obtained by cutting a separate stencil for each of the parts and then combining them to give related, but not quite identical, designs. Three of the many possible combinations are illustrated here. These are suggested for the front panels of the chest, that on the center being repeated on the ends. At left is the central theme.**

the same source. (For construction details, see P.S.M., April '46, p. 152). At the top of this page, a Pennsylvania Dutch theme has been broken down into its component parts. When made into individual stencils, these can be used to produce related designs for the top and the side and end panels of the chest. Only a small amount of freehand brush work will subsequently be required.

After sketching all the units to size on plain paper, transfer each to a stencil sheet with carbon paper, leaving plenty of margin. Two or three units can be placed on one sheet provided they are far enough apart.

Stencils usually are cut in a stiff oiled paper that may be obtained in paint stores. Your knife must be razor sharp. For flowing curves, use an easy sweeping cut and at intersections go beyond the line so that the inner part falls out without pulling.

Each part of the stencil is first transferred experimentally to the work with chalk of contrasting color. This makes it possible to judge when the proper spacing and arrangement have been obtained. The chalk can be rubbed off when the paint dries.

Thin the paint to the consistency of thick cream with a little Japan drier and a bit of turpentine. Be careful not to get the paint too thin or it will flow under the edges of the stencils.

The stencil brush should have straight stiff bristles, and a stippling motion should be used. Never attempt to spread or flow the paint. If you do not have the proper brush, a pad of velvet or felt can be used in the same way. It is well to do all of one color at one time, and let it dry thoroughly before applying another. Clean the stencils frequently to prevent smears.

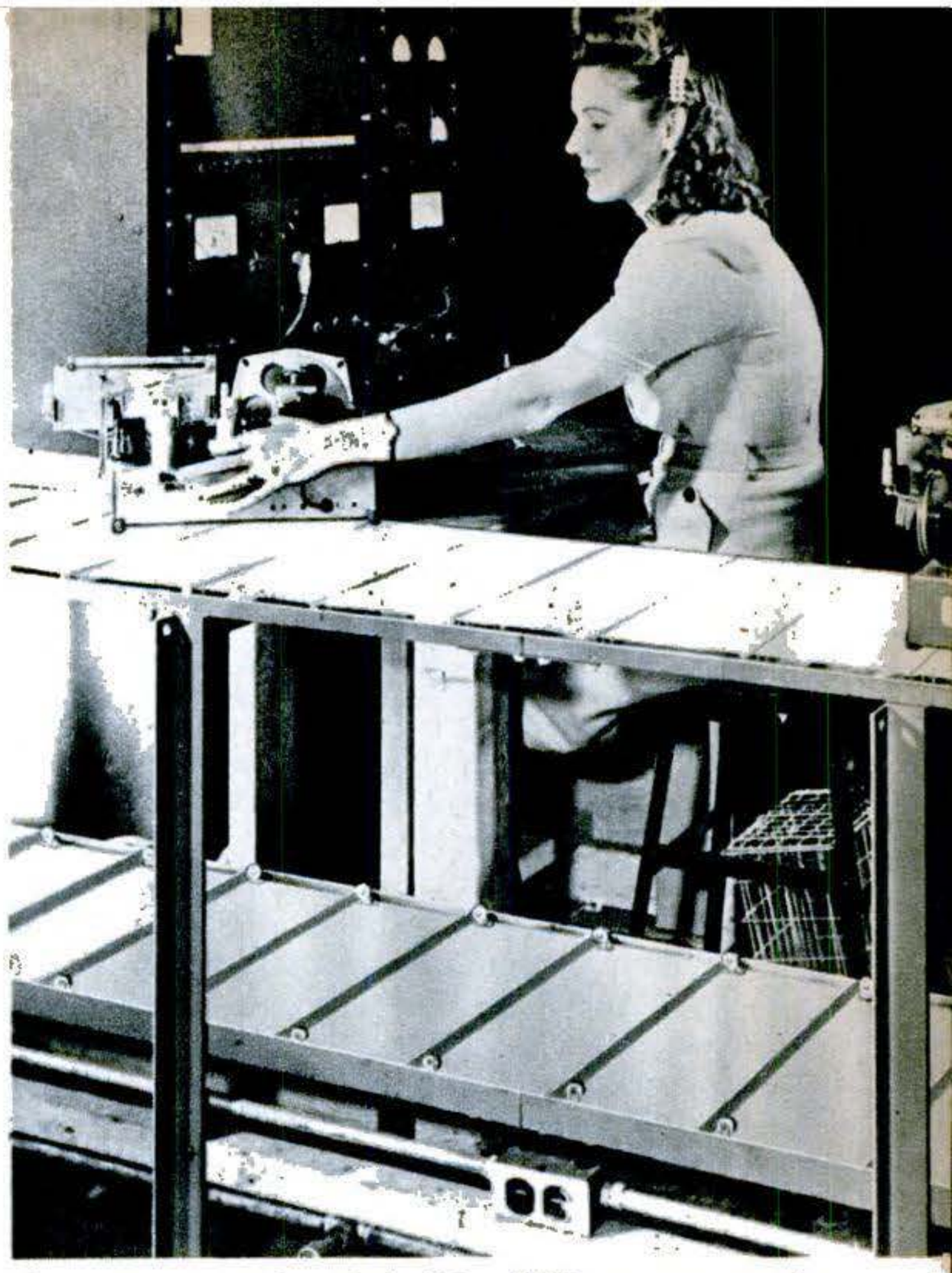


Copyrighted material

# NEW TOOLS

## All-Steel, 90-Foot Conveyor Speeds Assembly of Radios

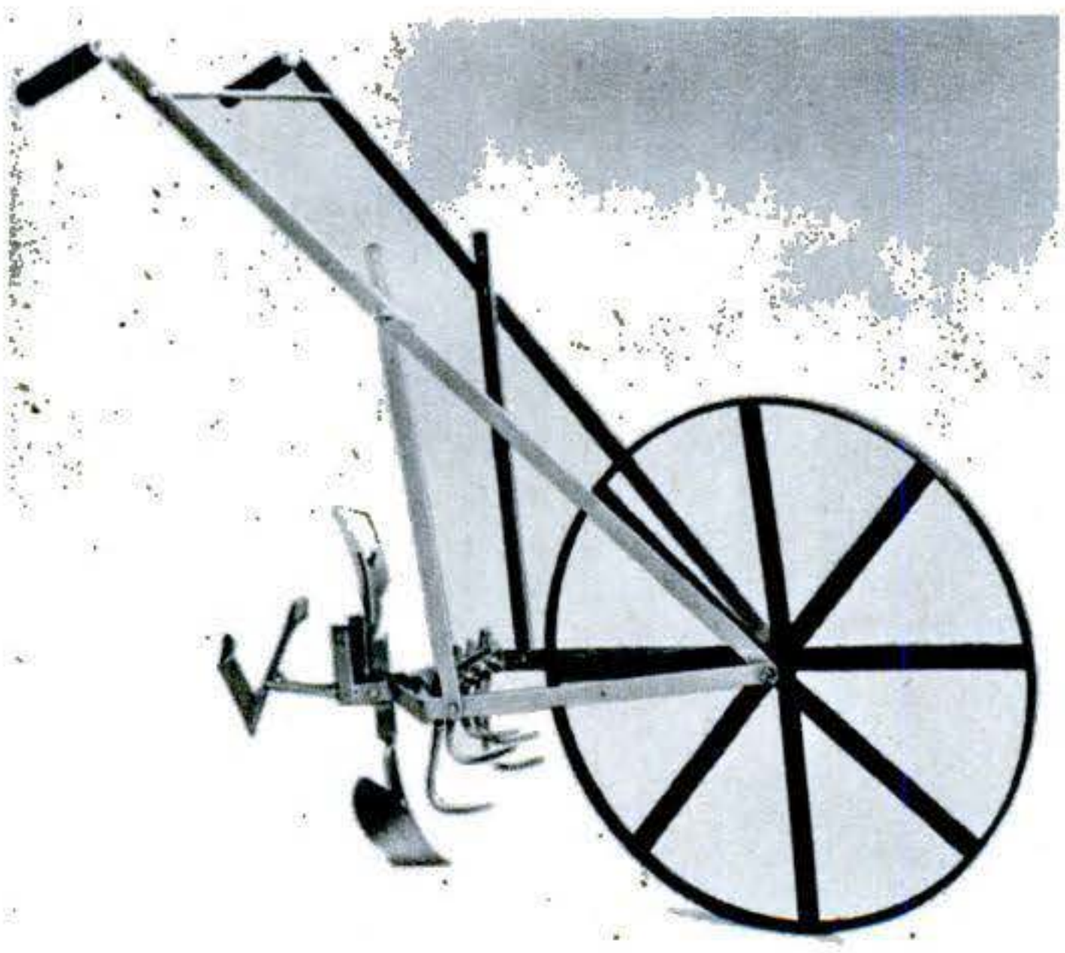
AN ALL-STEEL conveyor, 90 feet long, has been installed in the plant where Motorola radios are made. Its perfectly flat surface, consisting of a series of plates linked together in such a way that their operation is practically noiseless, speeds the process of assembling and inspecting sets. The Steel Parts Mfg. Co., Chicago, built it.



The quiet operation of the "Steelok" conveyor tends to lessen nervous fatigue in those who work at it.

## Gauges Curved Glass

CURVED sheets of glass and transparent plastics now can be gauged accurately with an Aireon Optical Micrometer. It is a microscope with a plastic nosepiece, which is held against the sheet to be measured. When the microscope has in sharp focus a mark on the other side of the sheet, the thickness of the sheet can be read on the micrometer's scale.



## Hand Cultivator Enables User To Change Tools with Foot

GARDEN farmers can accomplish most of their ordinary chores with a Suburban Jones hand cultivator, without a tedious delay for changing tool adjustments. This cultivator, made by Aircraft Mechanics, Inc., Colorado Springs, has four built-in tools on a rotary unit. The user can select the one he needs with his foot; each tool automatically locks in working position.

## Automatic, Adjustable Wrench Keeps Constant Grip on Nut

THE jaws of the adjustable Larc-o-matic wrench, produced by the O. W. Hedstrom Corp., of Chicago, keep a constant grip on square, hexagonal, metric, and odd-sized nuts while the handle is being moved. The wrench automatically ratchets and secures a 1/4, 1/6, 1/8 and 1/12-turn grip for close work. It is available in six-inch, eight-inch, and 10-inch sizes.

Ten-inch size of the Larc-o-matic wrench opens 1⅜ inches.

The wrench is shown in an open position here, before pressure is applied to hexagonal nut.

By a simple movement of the thumb-trigger adjustment, wrench's jaws are firmly closed.

Copyrighted material

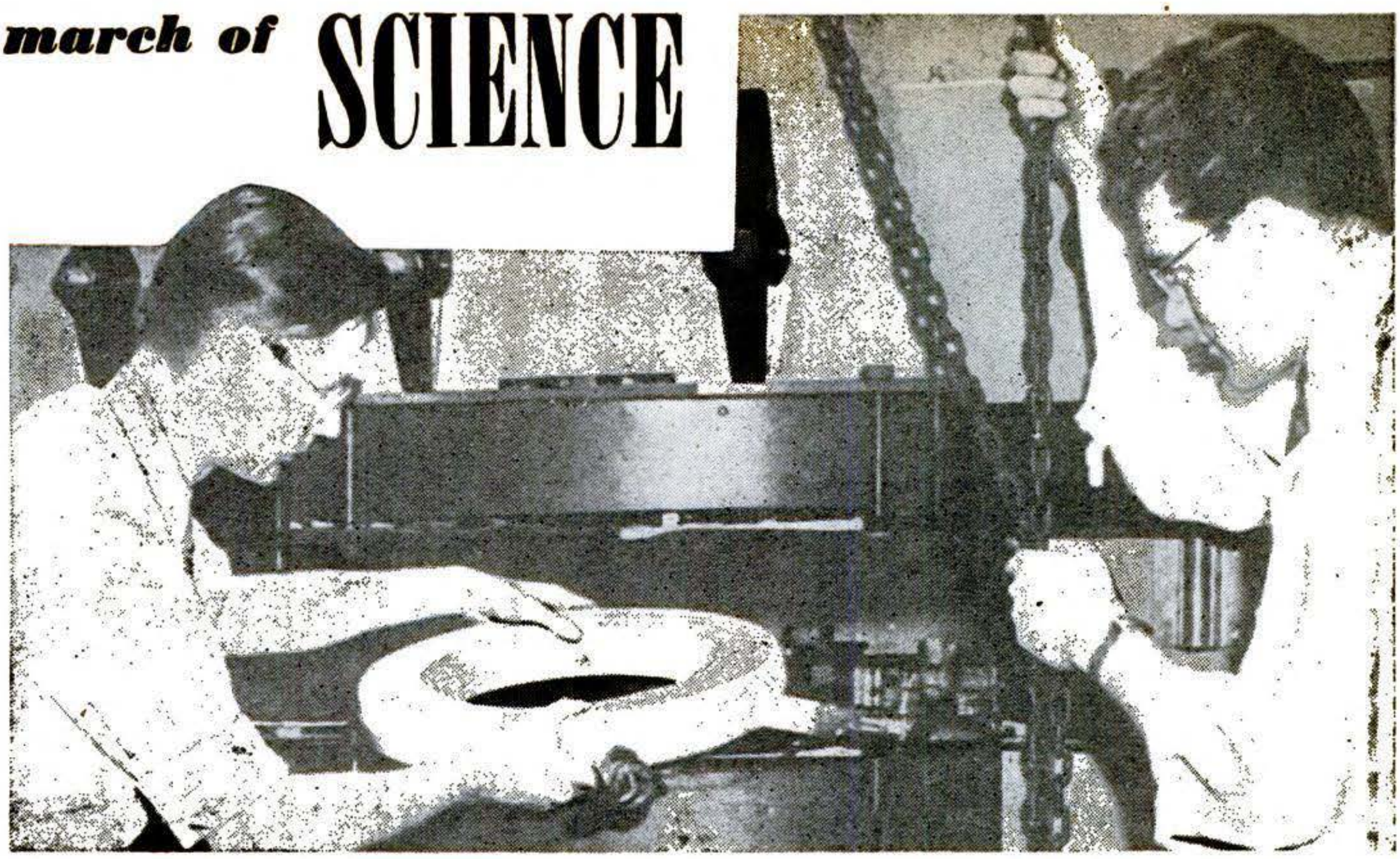
# Junior Edition of Mustang

ITS wings and tail assembly patterned after the famed P-51 Mustang fighter, North American Aviation's new low-wing private plane, the NAvion 4, carries four persons comfortably. Used as a miniature transport, it can haul 700 pounds of cargo in its spacious fuselage.

This newcomer to the personal-plane field is powered by a 185-horsepower, six-cylinder Continental engine that can pull the ship up to a ceiling of 16,500 feet. Its gross weight is 2,500 pounds, and its tank capacity of 40 gallons of fuel gives the ship a range of 506 miles cruising at 152 m.p.h. All landing gear is retractable.

The large, roomy cabin section is handsomely finished in two-tone upholstery, has a heater, and is furnished with a rear-view mirror and ash trays. Not unlike an automobile body, the cabin has a full-vision windshield, side windows, and a rear panel.

The NAvion 4 is tentatively priced at $6,250.



## Betatron Gets Porcelain Tube

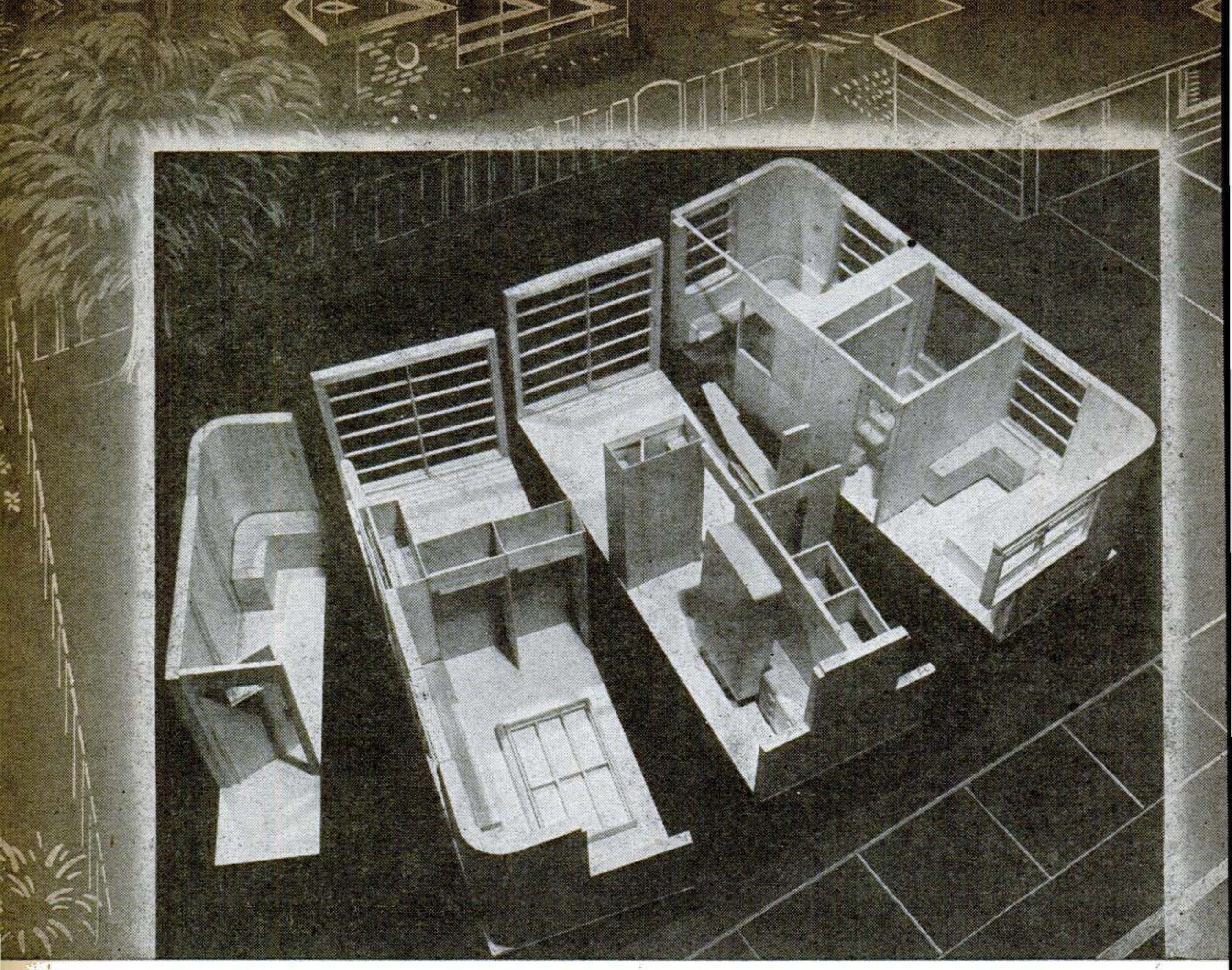
PROF. Donald W. Kerst (above, left), inventor of the first successful betatron, places a new porcelain vacuum tube into the machine that can locate flaws as small as one eighth of an inch in a huge piece of steel and can examine the interior workings of machinery enclosed in metal housings. The doughnut-shaped tube produces 20,000,000 X-ray volts that can penetrate steel 20 inches thick. Assisted here by Gail D. Adams, a fellow University of Illinois physicist, Prof. Kerst is now designing a betatron that will produce more than 250,000,000 volts of X-ray energy to be used for laboratory research in cosmic rays.

• • •

## Neptunium Poses for Picture

THE scientific pin-up below spotlights 10 micrograms of pure neptunium dioxide superimposed on a 10-cent piece (magnification, fortyfold). This man-created element is an essential link in the production of the atom bomb. The black portion to the right of the tear-shaped bead of the capillary tube is the neptunium, which would have to be multiplied 250,000 times in quantity to weigh as much as the dime. Neptunium, actually dark brown in color, is created in the atomic pile from a neutron bombardment of uranium 239. Next in the chain is plutonium, the atom-bomb explosive.

Copyrighted material



# Plastics go BIG

## The Atmosphere Molds

By GOLD V. SANDERS

PLASTICS products bigger than a barn door are now being turned out almost as easily as an ash tray. "There is no reason," says Egmont Arens, noted industrial designer, "why even a 50-foot boat cannot be built by the same techniques." Those techniques are based on low-pressure molding, a process developed during the war and now becoming more directly important to civilians.

The new methods do not supplant older ways of forming plastics but they are widening the uses to which synthetic resins can be put. Larger molded articles can be produced and reinforcing materials can be combined with plastics to make stronger end products.

Chemists took the first step when they created new synthetics capable of being "cured" without resort to the very high pressures and temperatures required for other molding methods. Engineers then found ways to take advantage of these properties. It was done first in the airplane industry.

The pressures employed to mold many of the common plastic articles we see around us run to thousands of pounds per square inch. Such force is needed to set up the polymerization or hardening process in the material and drive the plastic into every recess of the mold. Hydraulic presses to generate these pressures and alloy steel molds to withstand them are costly, and a cabinet for a table radio is about as big an article as it is ordinarily economical to produce in these ways.

The newer synthetic resins will "set" at pressures next to nothing and at room tem-

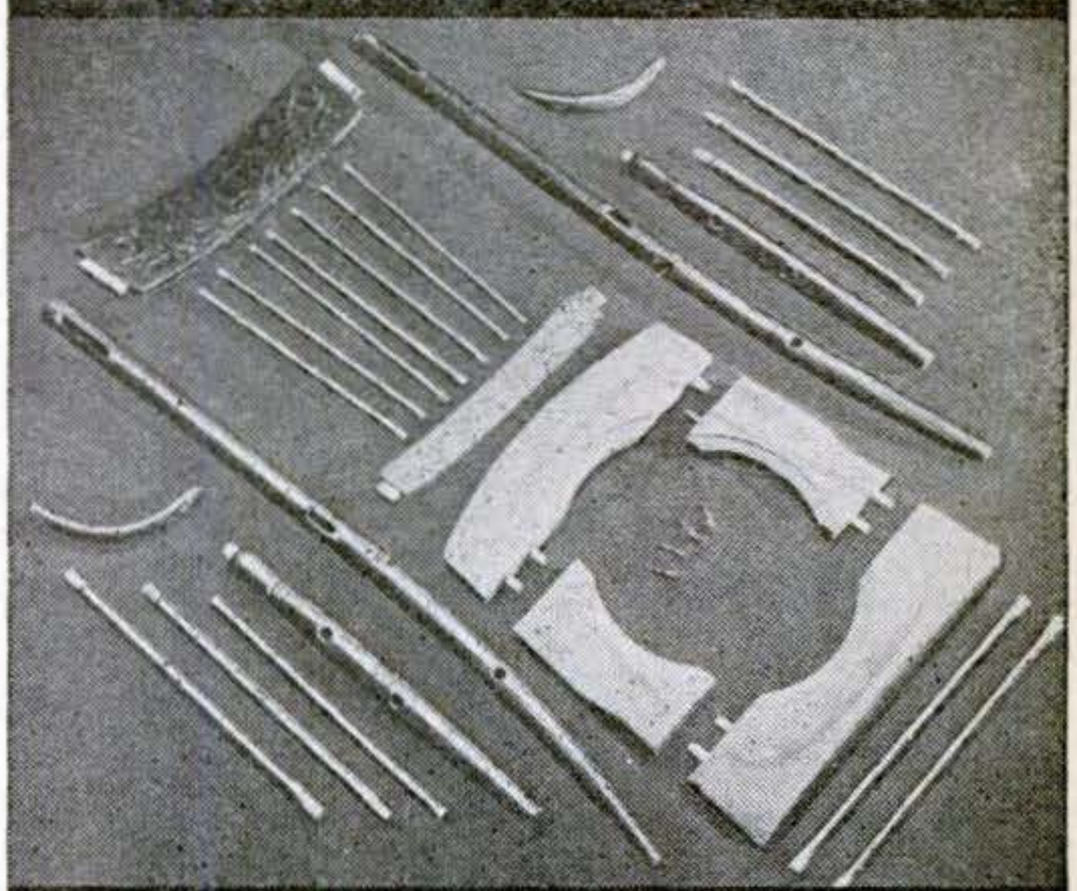


Copyrighted material

PLASTIC HOUSING UNITS already have been designed by Henry C. Carney, New York aviation engineer. Rooms can be shoved together as shown here when walls and floors are made of plastic-impregnated wood, paper or cloth, sandwiched between faces of plywood and molded by low-pressure methods.

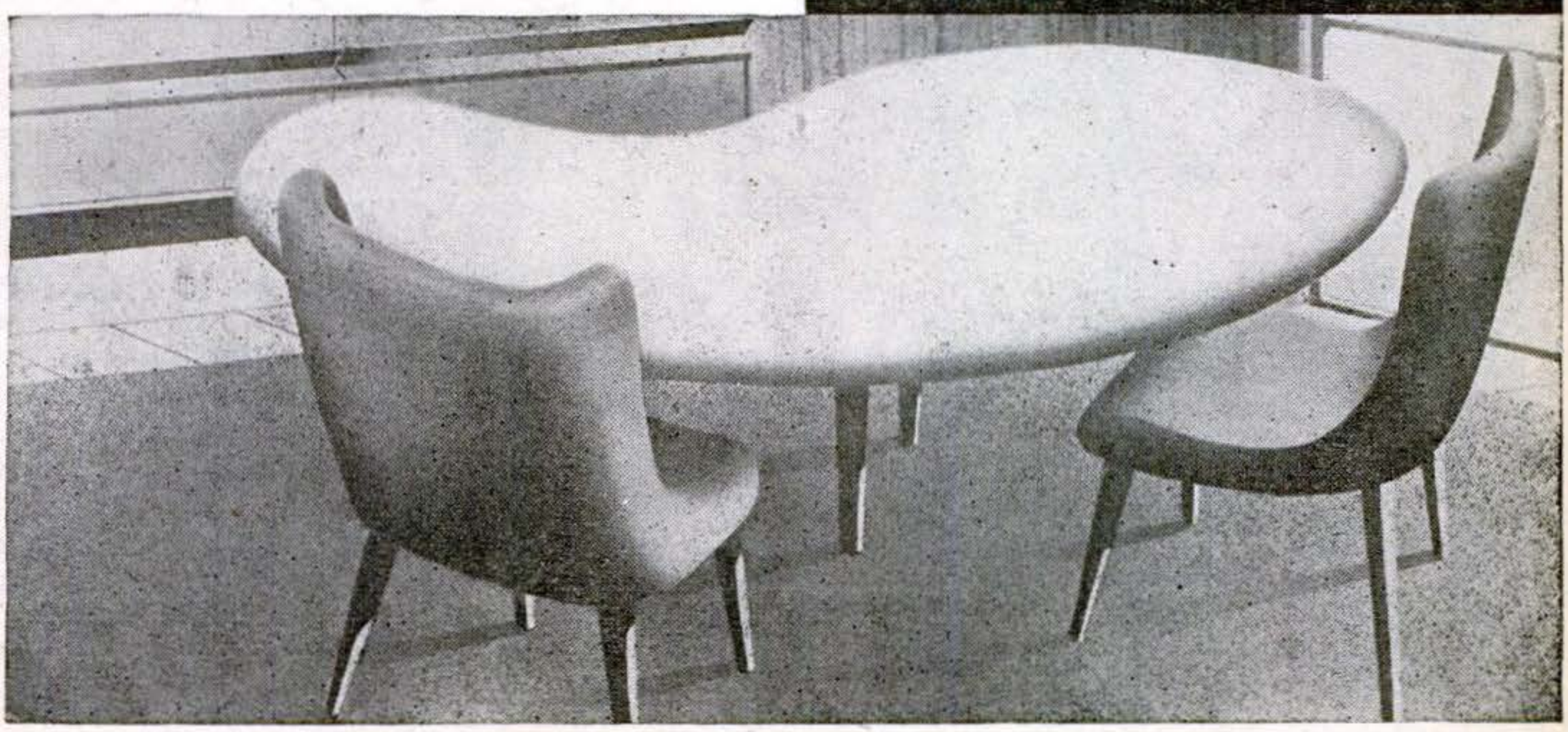
*Illustration by LESTER FAGANS*

A chair of combination plastics, easily molded, has only three parts, in contrast to the many in an ordinary wooden chair, shown disassembled below.



Body-fitting lines, which mark a suite of furniture (below) designed by Egmont Arens, are easily transferred to combination plastics under a small amount of heat and pressure. Arens predicts immense growth for low-pressure molding.

# New Materials into Homes.





Copyrighted material

U. S. Plywood's new "Honeycomb" material is one of many plastic sandwiches molded by low pressure for structural purposes.

"Honeycomb" has a core of fiberglas cloth impregnated wth a plastic resin. In this cutaway sample its face is of wood; at right it is of aluminum alloy.

A piece of sandwich material designed by S. R. Thompson for flooring in airplanes. Molding doubled the strength of its wooden I-beams.

This triangular plate of molded plywood is both strong and light. Its filler is one of the plastic resin adhesives.

Chance-Vought airplane stabilizer has balsa wood core between sheets of high strength aluminum alloy.

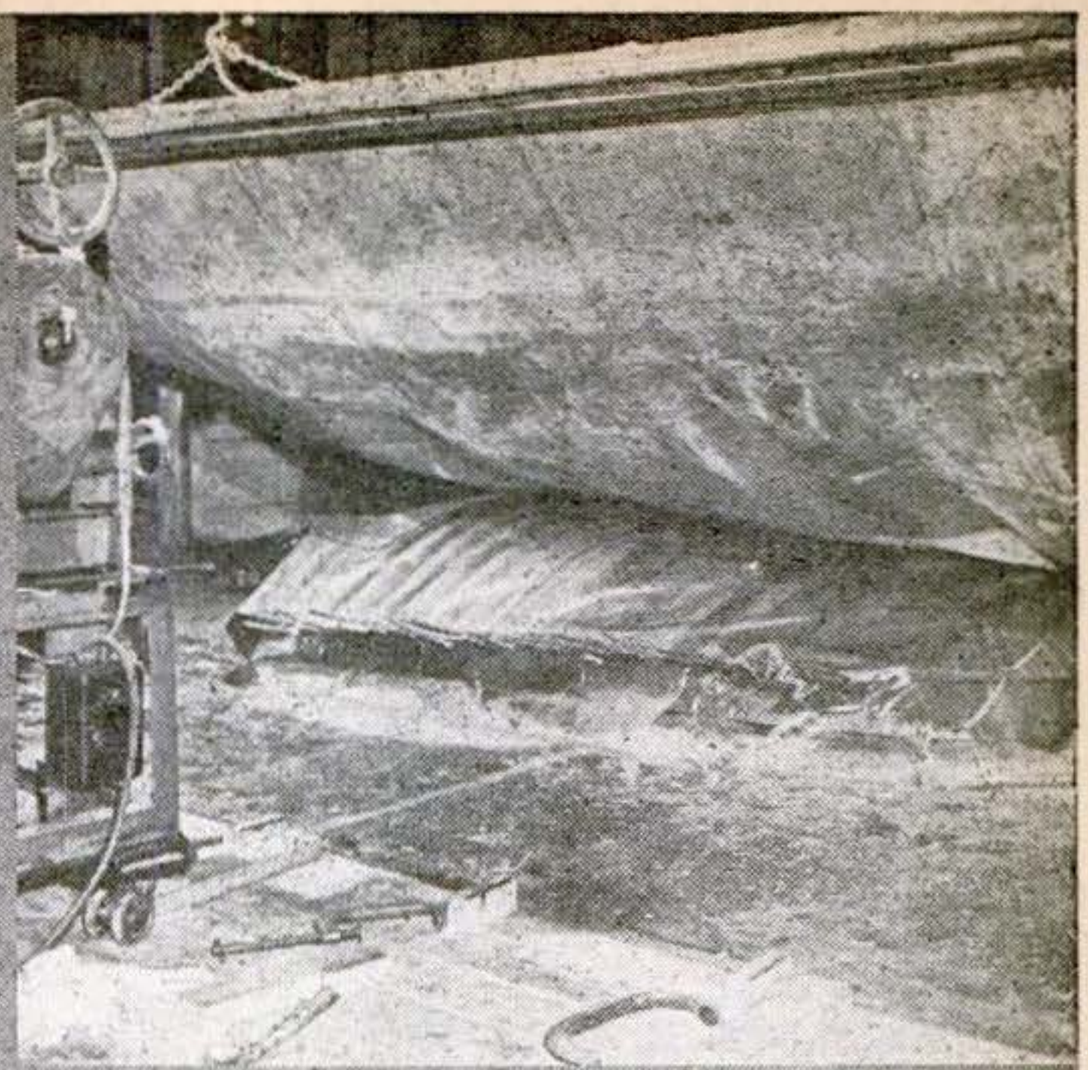
Huge structural part for airplanes is one of many turned out during the war by low-pressure molding.

perature. The atmosphere's pressure, less than 15 pounds per square inch, is enough to set these resins, and a vacuum process, involving a heavy rubber bag, has been developed to utilize it. This process and another, which requires pumping air into the rubber bag, are both diagramed on page 126. Heat is commonly applied by pushing the assembly into an autoclave, a steam chamber that can be sealed like a home pressure cooker.

Rubber blankets are used, too, both in autoclaves and otherwise, to hold pressure or create a vacuum. There are almost limitless ways, in fact, of molding the new sensitive resins. Hydraulic and mechanical presses and clamps of various kinds are employed, depending upon the size and shape of the article to be formed. Heat is sometimes supplied by batteries of infra-red lamps, hot air in large ovens, or steam jackets.

Just as the methods of forming are simpler and less critical in low-pressure molding than in other types, so are the molds used. Instead of alloy steel, they are made of wood, sheet metal, plastics, plaster, cast metal, and even concrete. Because the heat and pressure they are subjected to are not great, such materials serve very well. When rub-

Copyrighted material



1. Workmen above lay strips of veneer, slightly lapped like shingles, over a mold. This is a step in the Lap-Ply process, invented by Eugene O'Hare, Casein Corp. technical director.

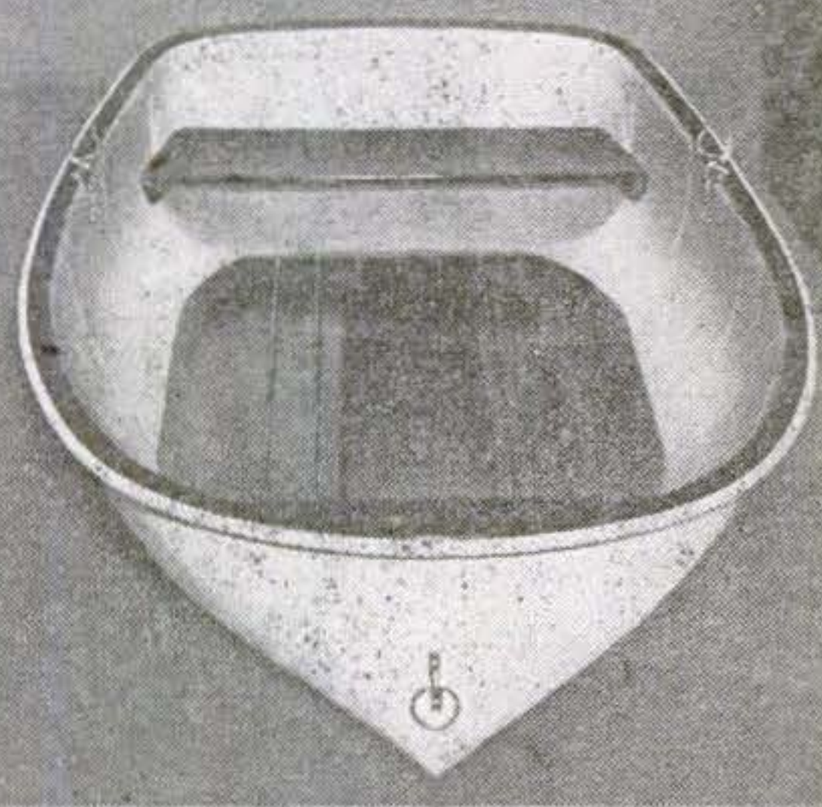
2. A rubber blanket (top right) is lowered over veneered mold of a deck cover. The blanket is made airtight and a vacuum is created, forcing veneers against mold.

3. Electric heating pads, laid on the blankets quickly "set" the plastic adhesive between plies of wood. The finished deck cover (right) is entirely without seams.

ber blankets or bags are used, they become virtually one side of the mold, thus avoiding the expense of making a matching pair of molds.

There are as many ways of combining the materials used by low-pressure molders as there are ways of molding them. The synthetic resins are reinforced with wood, paper, fabrics, vegetable fibers such as sisal, fiberglas, and even metal. The resins generally make up less than half of the low-pressure product, the rest being the cheaper reinforcing materials. Such reinforcing material cannot well be used in compression or injection molding.

Combination plastic products are like reinforced concrete in that each material adds strength to the others when they are combined. The combined material is extremely strong for its weight. This doubtless is why the aviation industry pioneered the low-pressure techniques and largely developed them so far. Aviation engineers have produced a great many airplane structural parts of plastics that proved stronger for their weight than anything else that could have been used. Whole airplanes, such as the British Mosquito bomber, have been made of wood veneer bonded with plastics.



There are no seams in the one-piece, 8-foot dinghy above, built of sisal by the Abbott Boat Co. It weighs 80 lbs.

Streamlined housings of all kinds—radomes, antenna covers, jettison fuel tanks—have proved to be strong and efficient while saving weight to an important degree.

Low-pressure methods have given birth to a variety of "sandwich materials" suitable for structural members wherever lightness with strength is essential. In the Mosquito bomber, the filler of the sandwich is balsa wood, with laminated wood veneer skins bonded to it with plastic. Other sandwiches have cores of corrugated paper or cloth that become surprisingly strong when impregnated with resin. Engineers have tried using a new plastic "foam" for a sandwich filler that gives promise of still greater saving in weight. This plastic sponge weighs only about one seventh as much as cork.

The faces of these sandwiches are made of wood, sheet metal, or impregnated cloth and paper, laminated and cured. They need not even be of the same material. A metal face can be used on one side and wood on the other.

Sandwich material would seem to be well adapted to the building of lightweight prefabricated houses—for walls, floors, ceilings, partitions and roof. Henry C. Carney, an aviation engineer of wide experience, has designed a small five-room house to be fabricated of such sandwich stuff with a filler of corrugated paper. The house would be made in four parts, each light enough to be trucked to the building site.

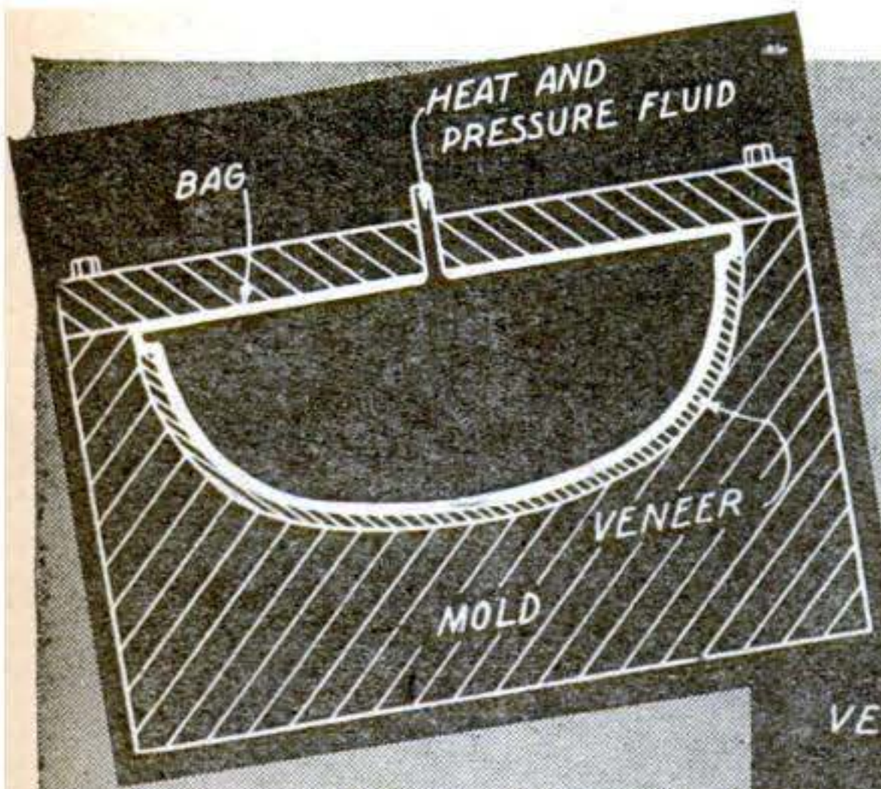
How cheaply such houses can be built and how satisfactory they will be remains to be seen. But if we are to have a plastic house it will surely be made by low-pressure molding techniques. Synthetic-resin adhesives much like those used in these molding processes are the magic ingredients in exterior plywood, now being employed in outdoor construction of many kinds. These glues are the first genuinely waterproof adhesives. They are plastics from the same phenolic base as your telephone handset.

The low-pressure molding industry is converting to civilian production. The first nationwide conference of its technicians was recently held in Chicago. Experts comparing notes there found that the following products of low-pressure molding are now being produced or soon will be: Prefabricated homes, furniture, luggage, caskets, boats, instrument cases, doctors' kits, radio cabinets, table tops, wall paneling, plywood surfacing, back panels for refrigerators, doors, artificial limbs, instrument housings, window sashes and frames, drainboards, serving trays, football helmets, aircraft parts, ice dispensers, solid sheet roofing, radar housings, and electronic insulation.

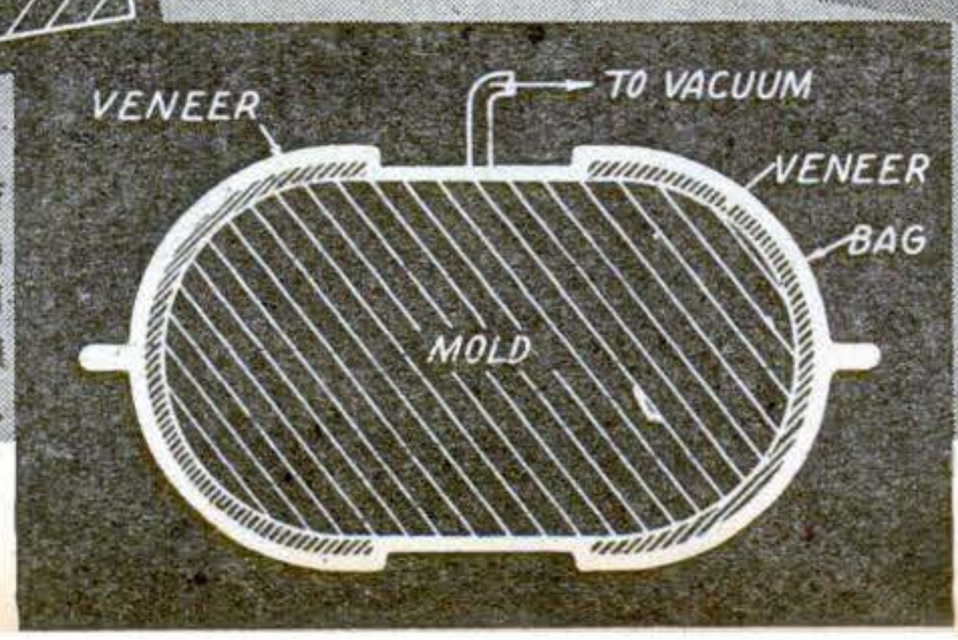
Egmont Arens predicts that within five years the low-pressure molders will use a far greater tonnage of plastics than the high-pressure fabricators, dominant until now.

Four types of molded boats displayed at the convention all had continuous skins—no seams to calk. Boat builders are somewhat ahead of other manufacturers because they turned out such craft for the Army and Navy during the war. Plywood boats are products of low-pressure molding. Others are made, all in one piece, of impregnated duck, sisal mats, and various combinations of plastic-impregnated materials. All are strong, durable and seamless. The boat-makers are trying to cut costs and are constantly working on new techniques.

For many small articles that are better made of plastics than any other material, high-pressure molding still is more economical, more automatic. The same is true of the extrusion method, which produces another horde of plastic items. But low-pressure molding, the youngster of the family, seems to be a lad with a brilliant future.




One way (left) to mold in an autoclave (steam chamber) is to put a rubber bag inside a hollow mold lined with the plastic material to be formed. Air forced into the bag holds material in place for curing.



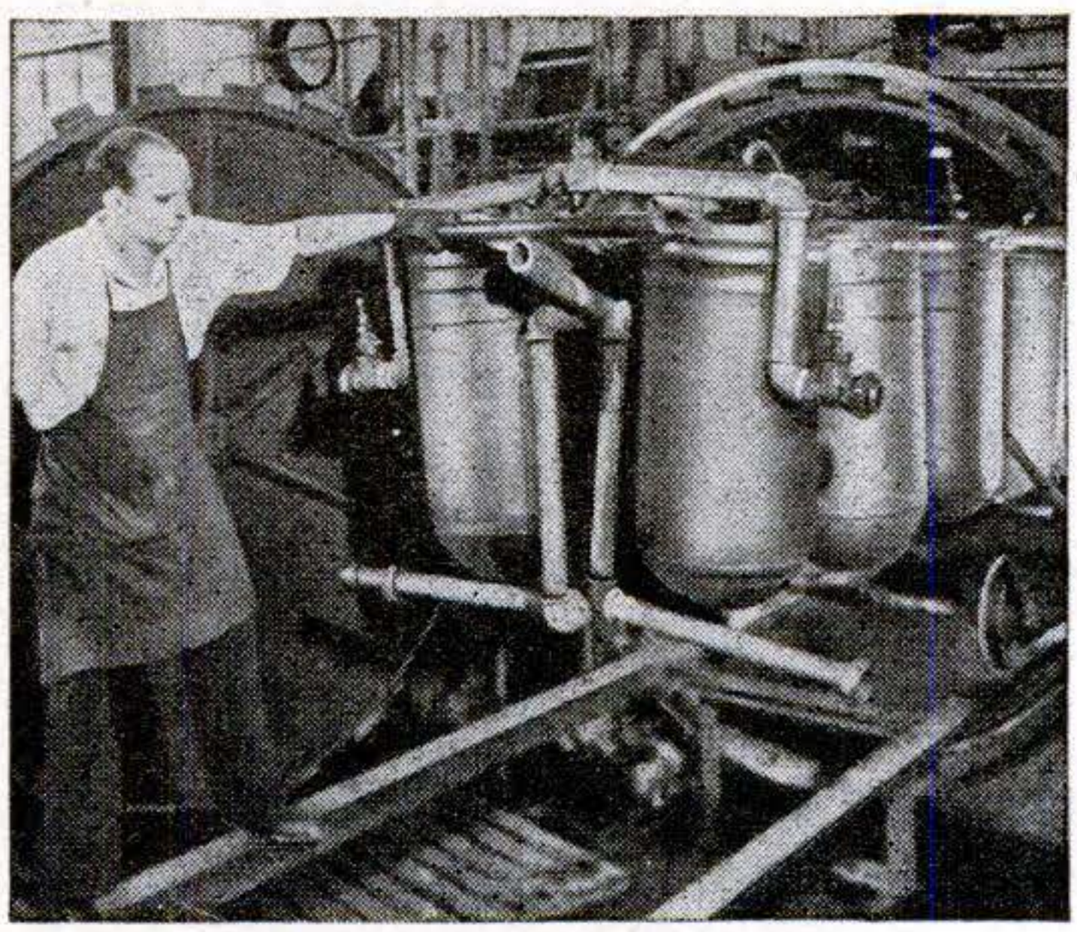

In the vacuum method (right) of autoclave molding, the rubber bag is laid over both plastic material and mold. Vacuum is then created in the bag, drawing it inward.

This gunner's seat is made of laminated cloth, impregnated with one of the low-pressure molding resins. It is as strong as sheet metal and weighs much less.

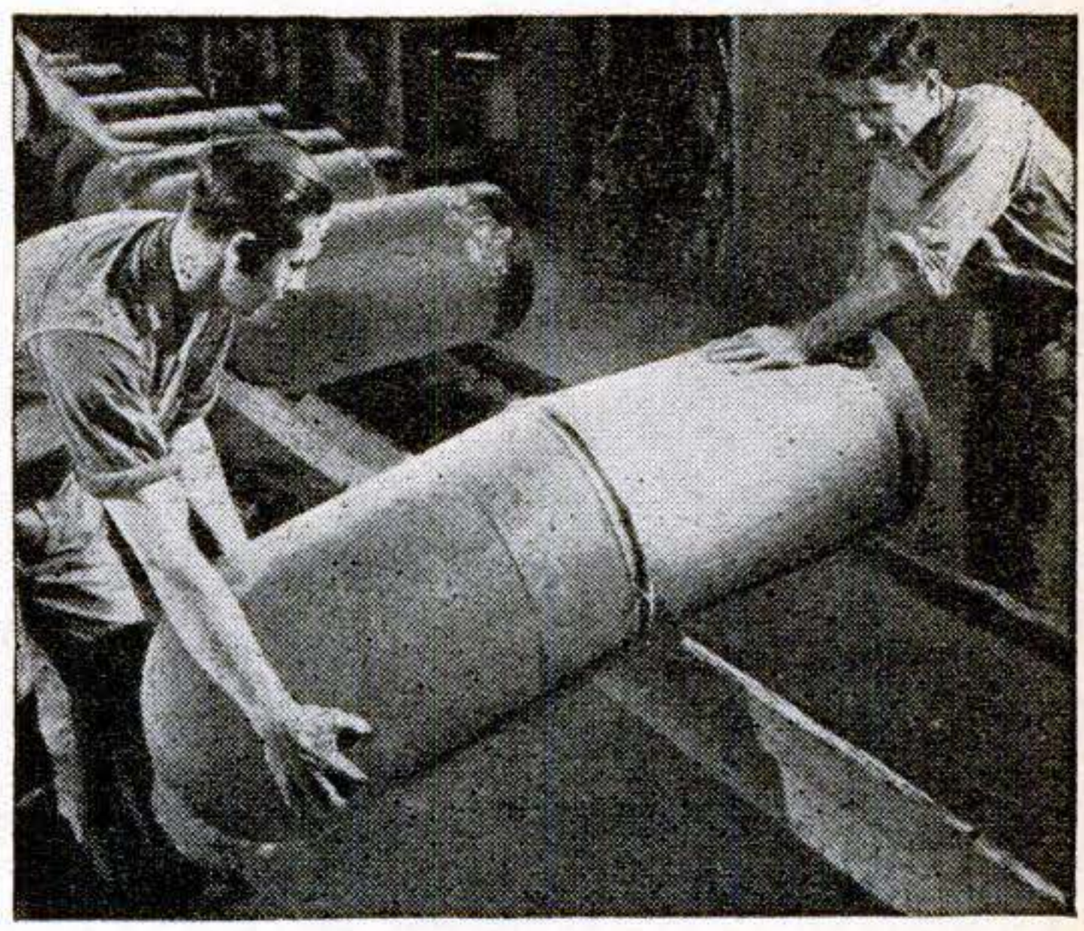
Copyrighted material

**1** Fiberglas cloth and synthetic resin made radar covers (radomes) during the war. Girls here fit cloth to a mold.

**2** Pouring the "syrup." An exact amount of plastic varnish is spilled over the fiberglas "sock" after it has been fitted.



**3** A batch of radomes is shoved into an autoclave, where they will be cooked into solid, rigid, very strong pieces.



**4** When the radome comes out of the autoclave, cured, it is removed from the mold by blowing compressed air inside.

**Baby buggy bodies take shape from a loose pad of sisal impregnated with plastic. Heat and pressure convert the pad into a strong, light, one-piece body.**



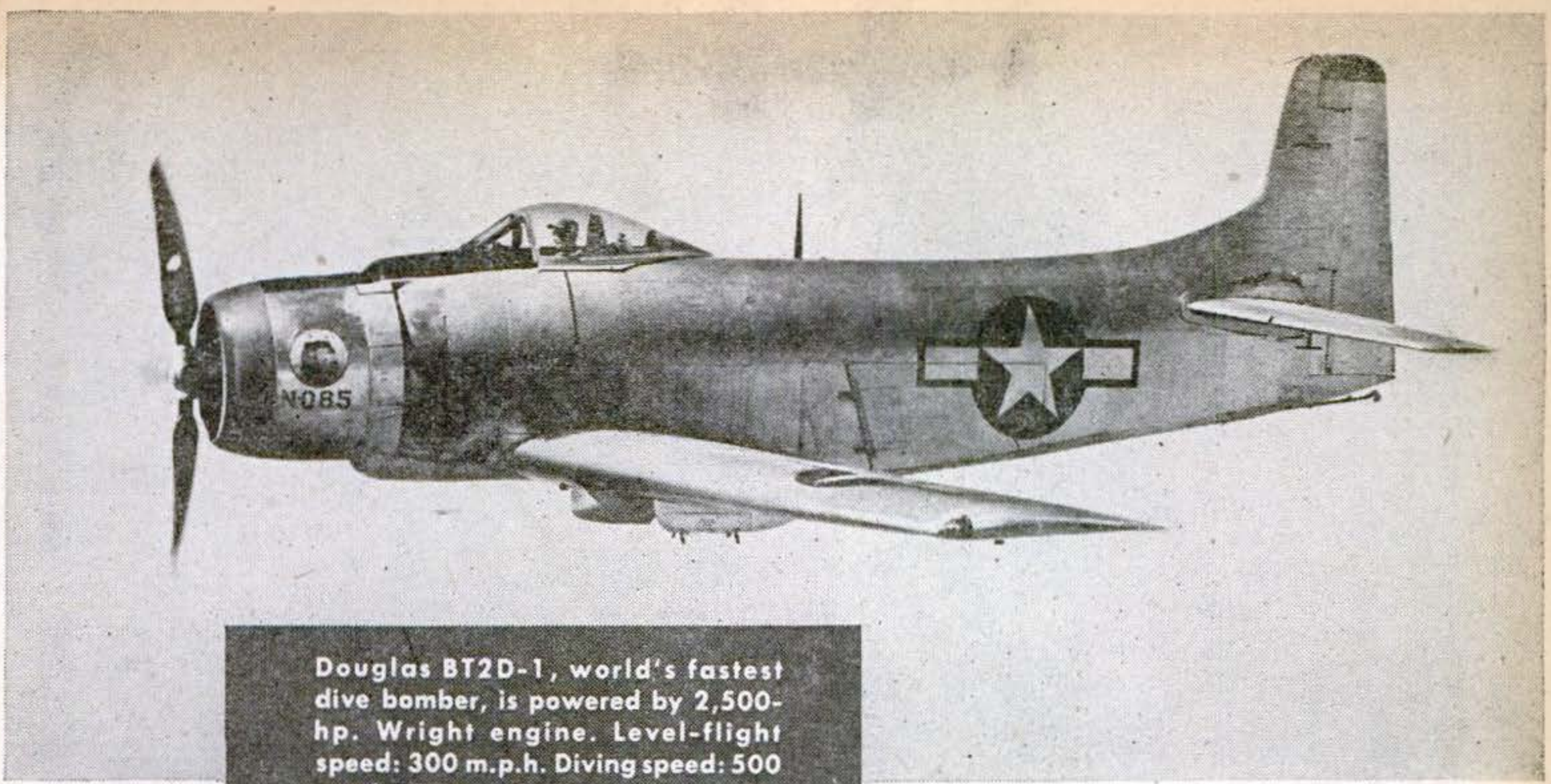
Copyrighted material

Hurtling skyward at almost a 45-degree angle, a jet-propelled Lockheed P-80 Shooting Star gets added push from two external rocket-assist units that cut the take-off run in half. The rockets develop 2,000 pounds of thrust for 12 to 15 seconds to supplement the 4,000 pounds of thrust generated by the GE I-40 jet turbine.

A cold-starting fuel for aircraft operating in subzero temperatures eliminates all preheating equipment used in "warming up." Developed by The Texas Company, the new fuel is bottle-fed into the regular fuel lines after the main lines are shut off. After a two-minute warm-up bottle is removed, and engine draws fuel from regular gasoline tanks.



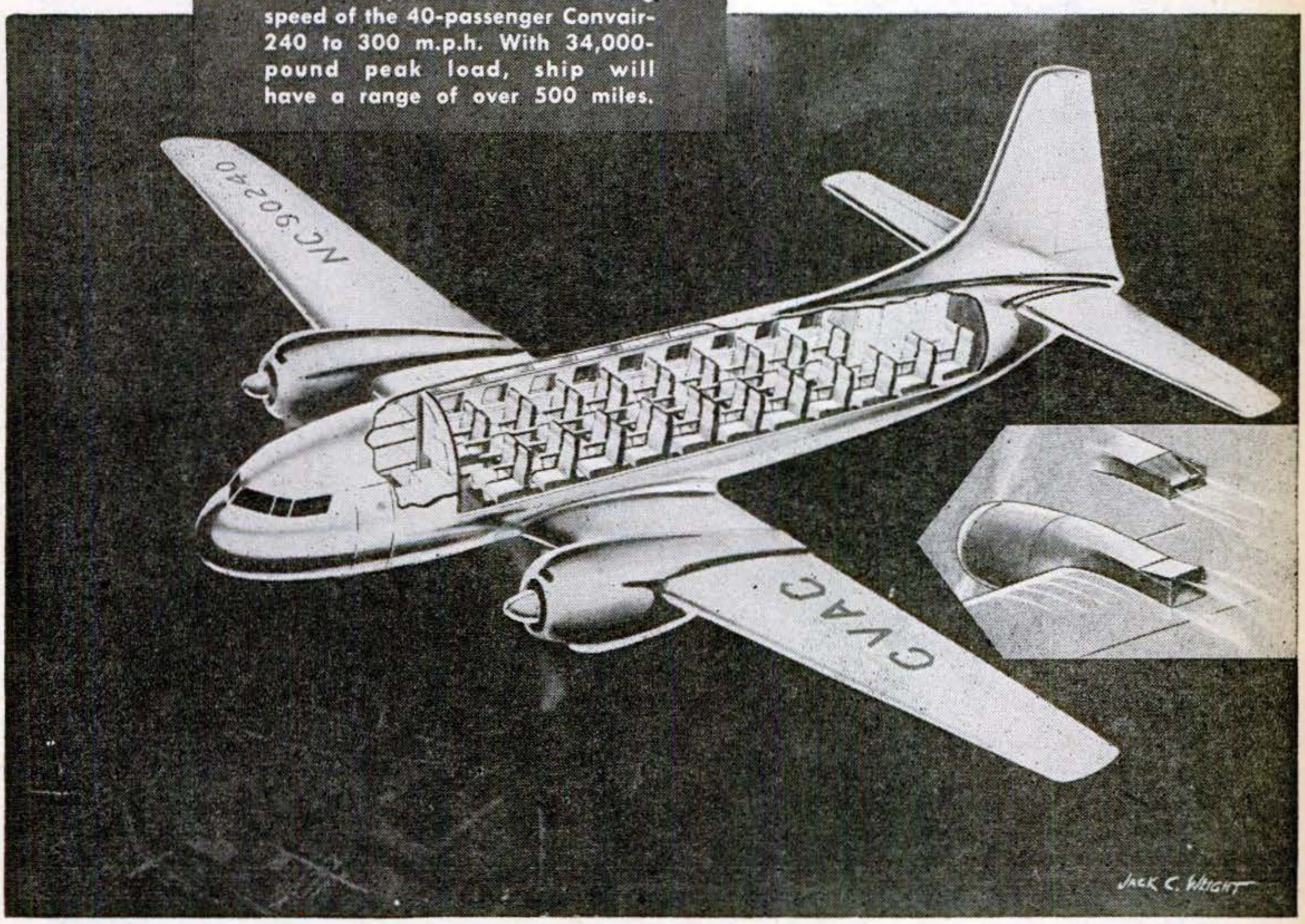
Copyrighted material




Douglas BT2D-1, world's fastest dive bomber, is powered by 2,500-hp. Wright engine. Level-flight speed: 300 m.p.h. Diving speed: 500 m.p.h. Range: 1,500 miles. Armament: 6,000 pounds of bombs, rockets, torpedoes; wing machine guns.

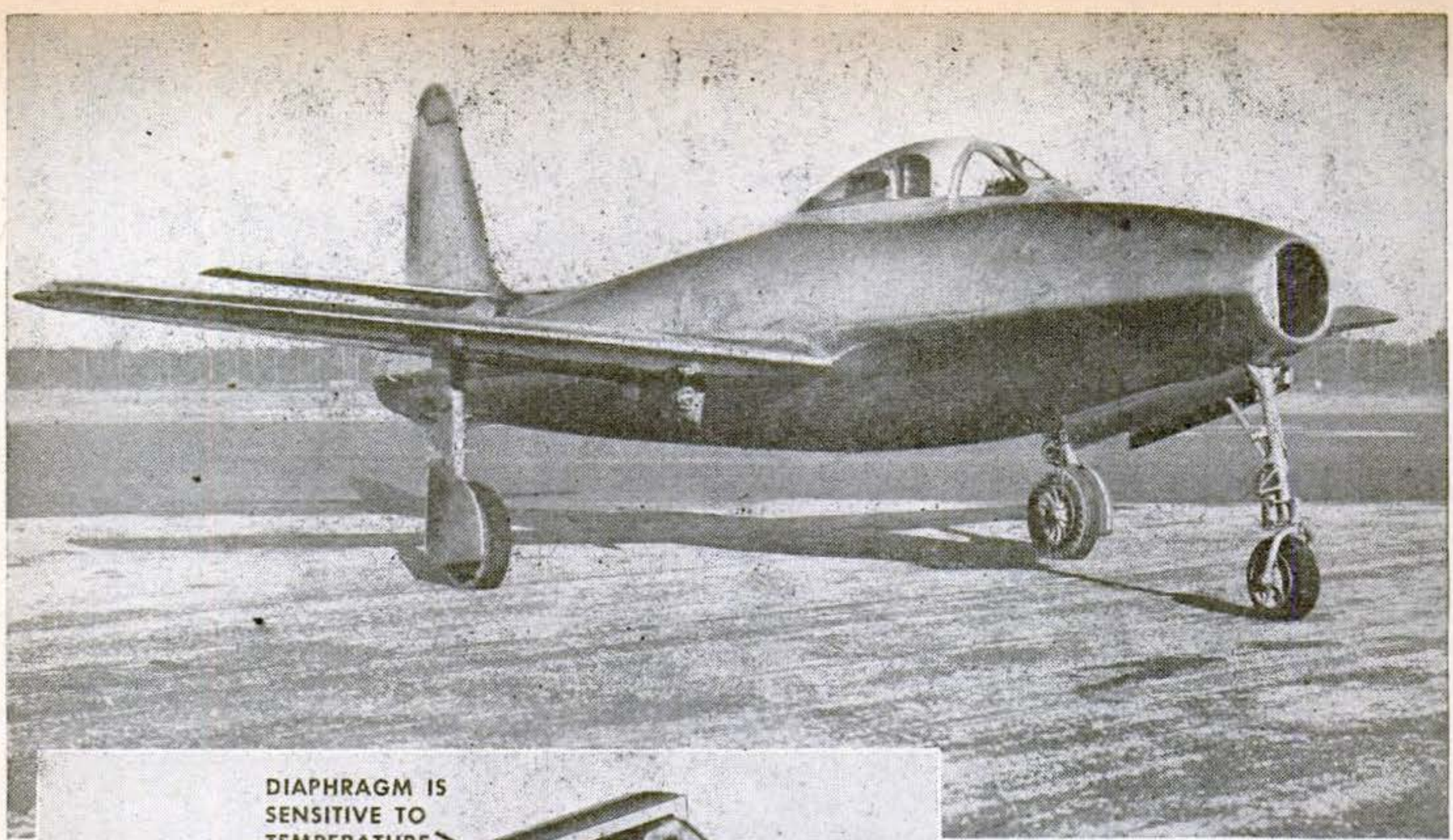
# WHAT'S NEW in AVIATION

Use of exhaust from the two Pratt & Whitney 2,100-hp. engines (see inset) helps boost the cruising speed of the 40-passenger Convair-240 to 300 m.p.h. With 34,000-pound peak load, ship will have a range of over 500 miles.

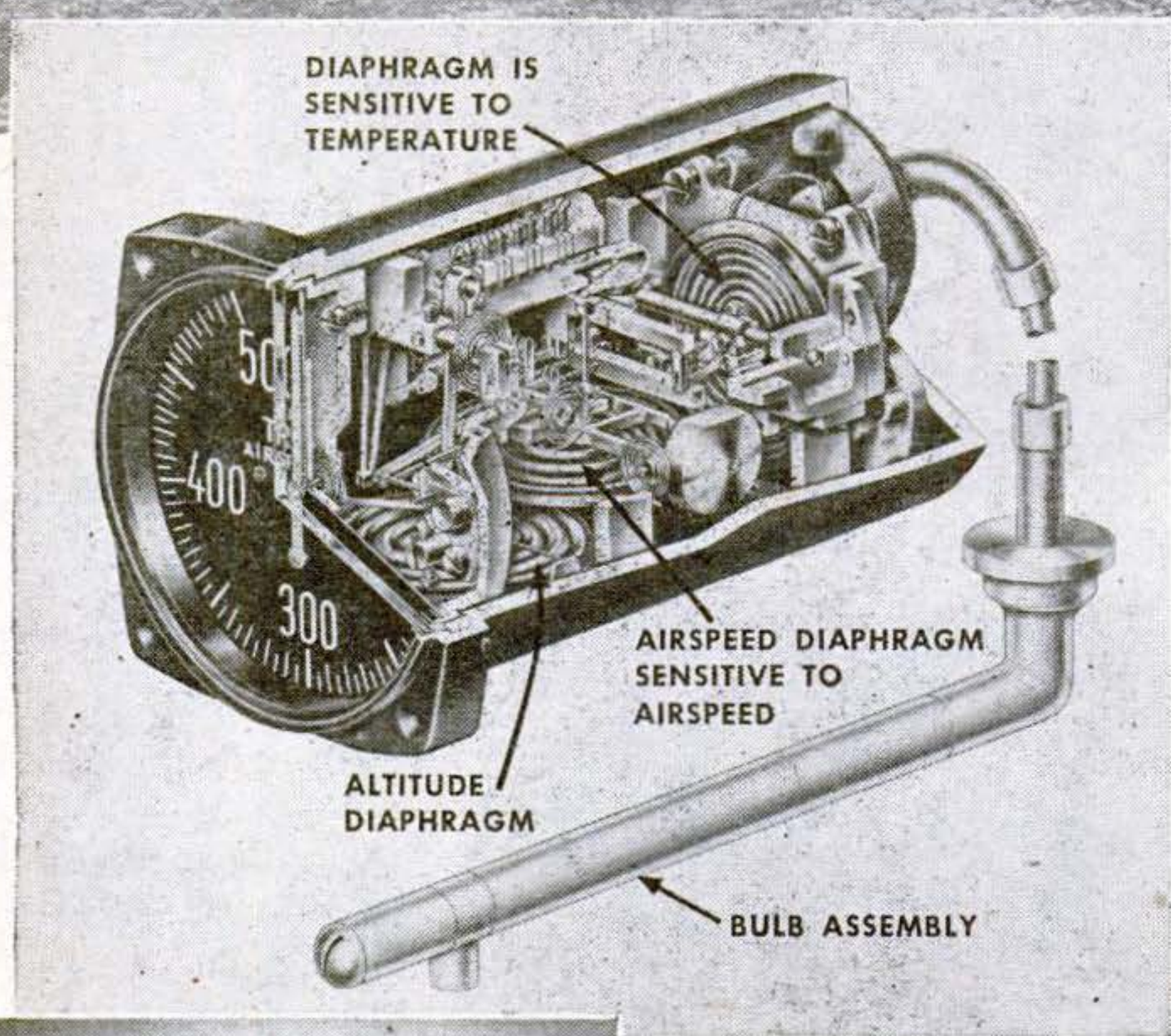





Copyrighted material

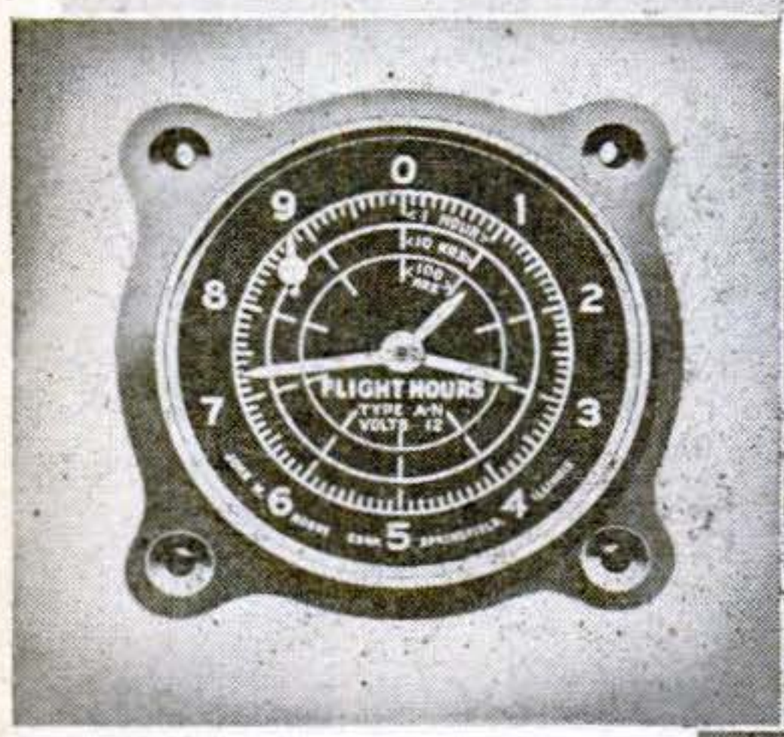


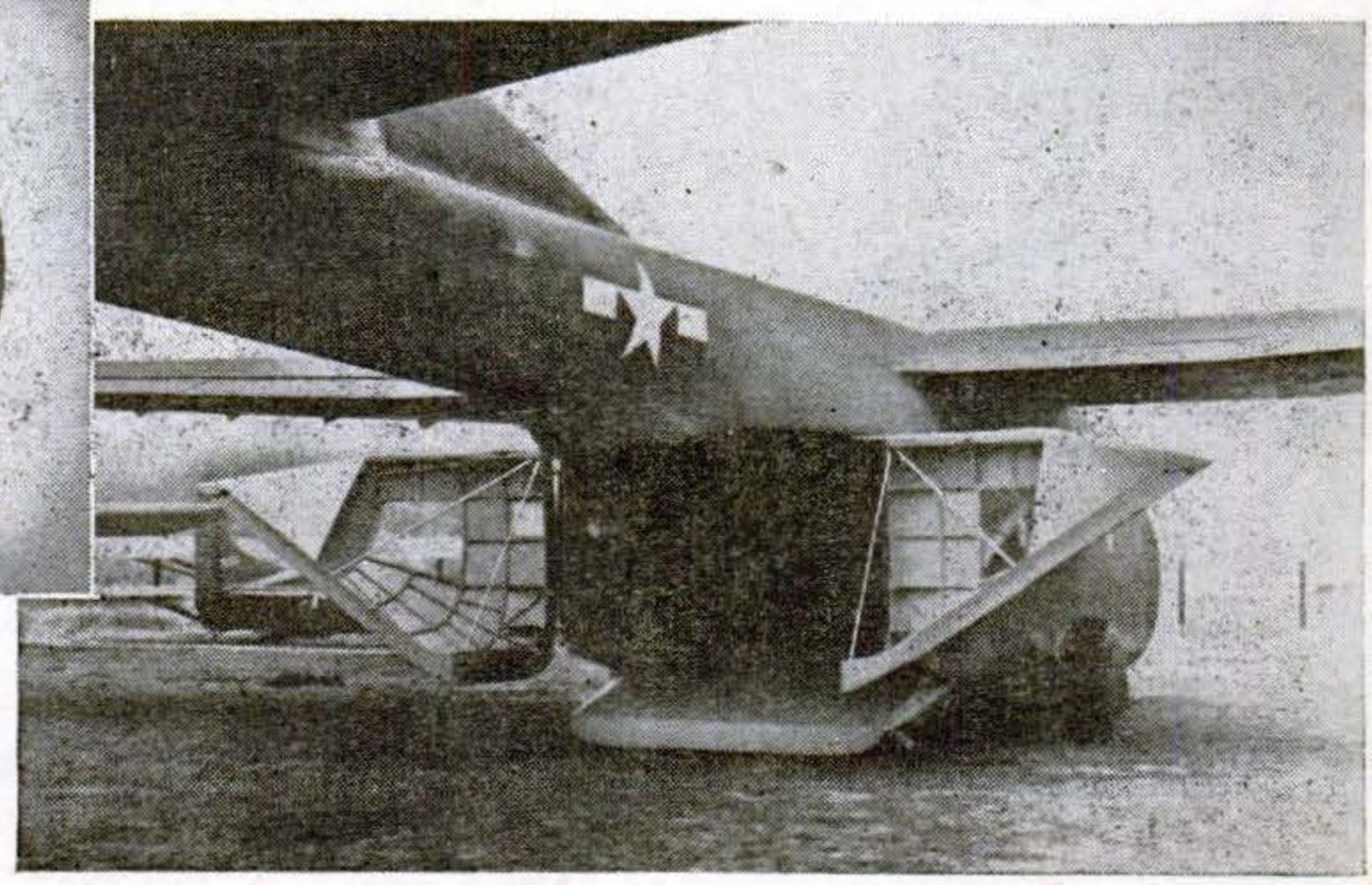
Republic's XP-84 Thunderjet fighter, successfully test-flown, is powered by a new axial-flow GE jet unit. Note the air scoop in its nose.




The Kollsman True Airspeed Indicator (left) eliminates involved human computations and shows accurately and instantly the speed at which an airplane is flying.

Bulky air freight (11,500 lbs. of it) can be loaded on fat Laister-Kauffman transport below. Its two Pratt & Whitney engines can be removed in 8 hours, making it a glider.



The Hobbs Flight Hour Meter automatically logs a plane's actual flying time. A switch actuated by air pressure controls the meter.



Copyrighted material

Minute radio circuit "printed" below is actually the same as the conventionally assembled one at the left.

## Tiny Circuits of Silver 'Ink' Baked on Ceramic Base Plates

**By HARTLEY E. HOWE**

TECHNIQUES borrowed from the graphic arts now "print" whole radio circuits. The maze of wiring is replaced by a pattern of silver "ink" on a ceramic base as hard as a gem. Resistors are sprayed on. Condensers are paper-thin disks. Tubes are the size of flashlight bulbs. The result is a circuit that is not only extremely compact, but rugged, simple to check and repair, and easy to manufacture quickly and precisely.

Once again one industry has borrowed a process from another, as in the adaptation of paper-making techniques to tin-plate manufacture. In this case, it is the familiar silk-screen process used in printing labels, posters, and textile designs. With it, a master circuit can be reproduced simply and exactly from a pattern almost as easily as a calling card is printed.

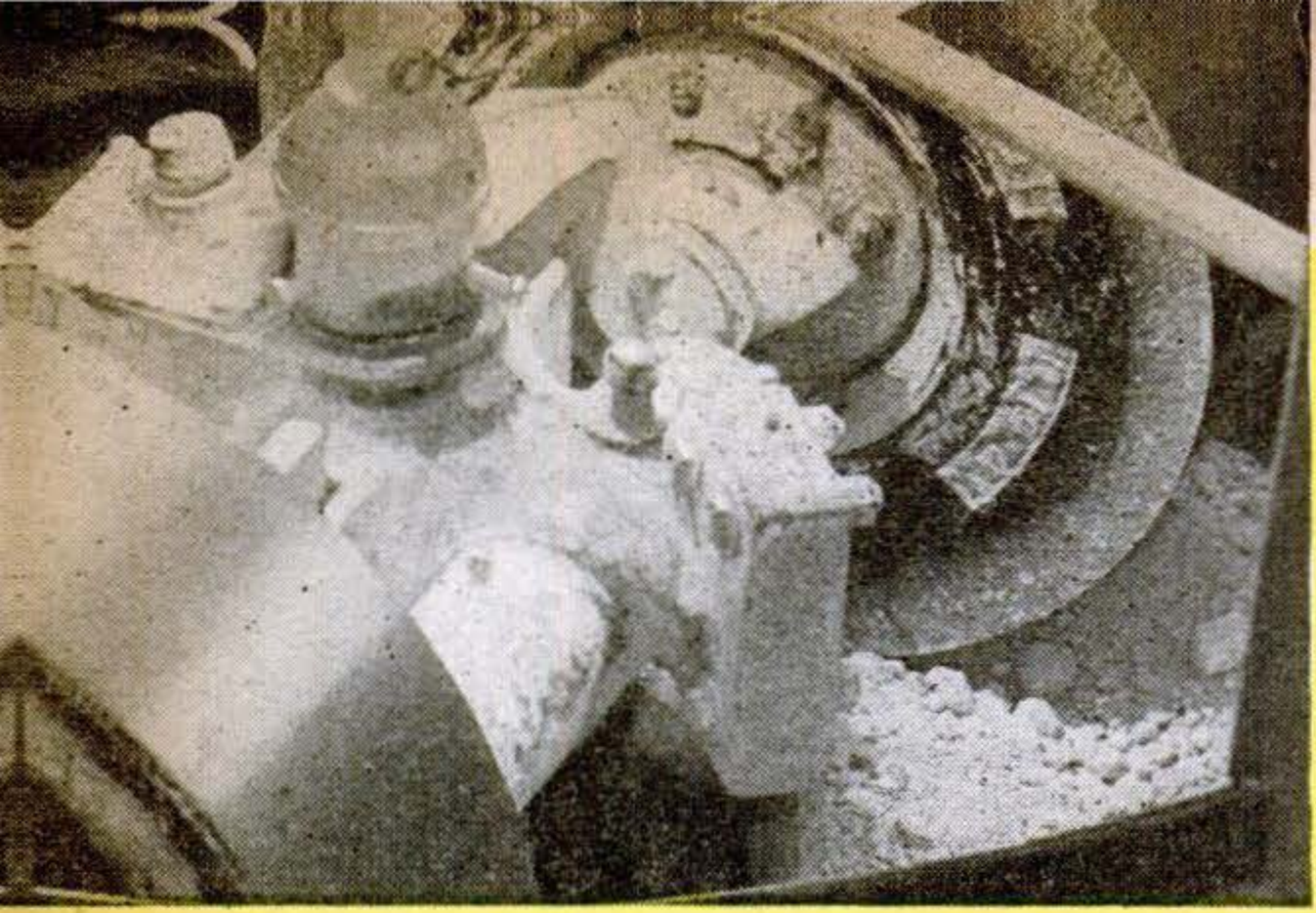
Behind the new application of this old process lies a wartime search to perfect one of our most potent secret weapons, the proximity fuse (PSM, Dec. '45, p. 86). This deadly gadget enabled an antiaircraft gun to knock down a hostile plane without a direct hit, by an elaborate electrical hookup that exploded the shell as it neared the target. The fuse, no longer than an ordinary radio tube, carried a completely self-contained turbogenerator, control circuits, safety devices, and an entire radio transmitter-receiver.

The space problem was tough enough, but a worse one was the terrific impact that the fuse had to sustain at the moment of firing

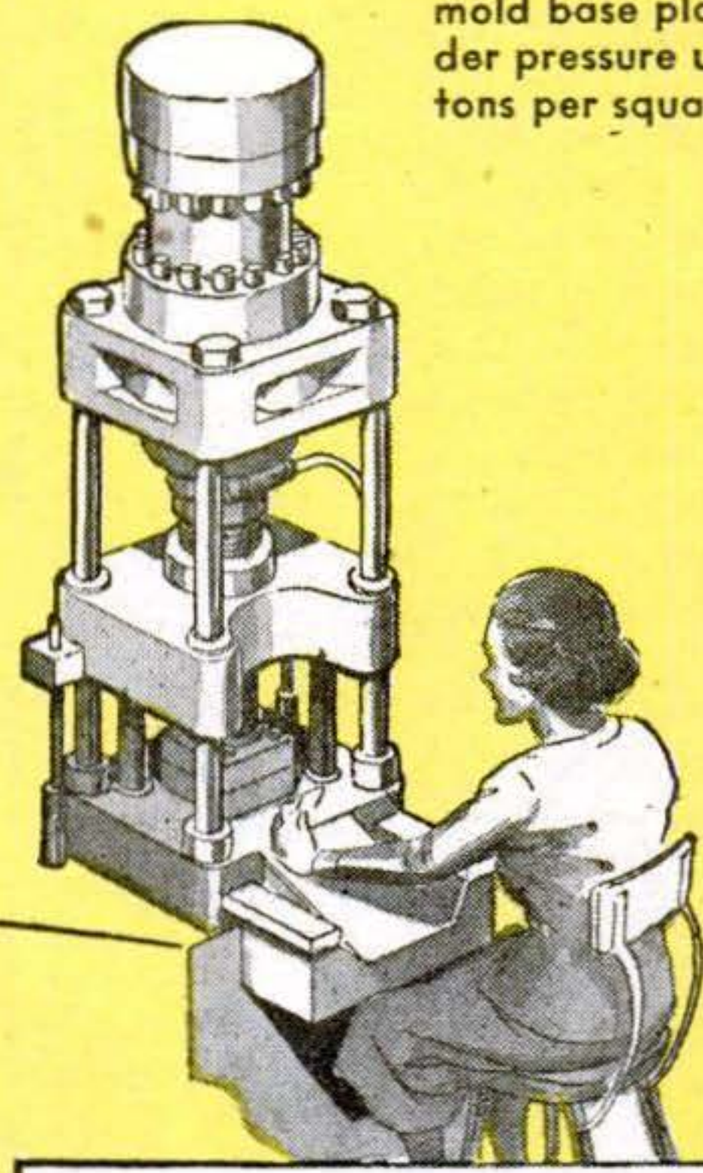
Methods developed to build an entire radio transmitter-receiver into the deadly proximity fuse, here compared in size to a standard radio tube, are used in printing radio circuits for commercial purposes.



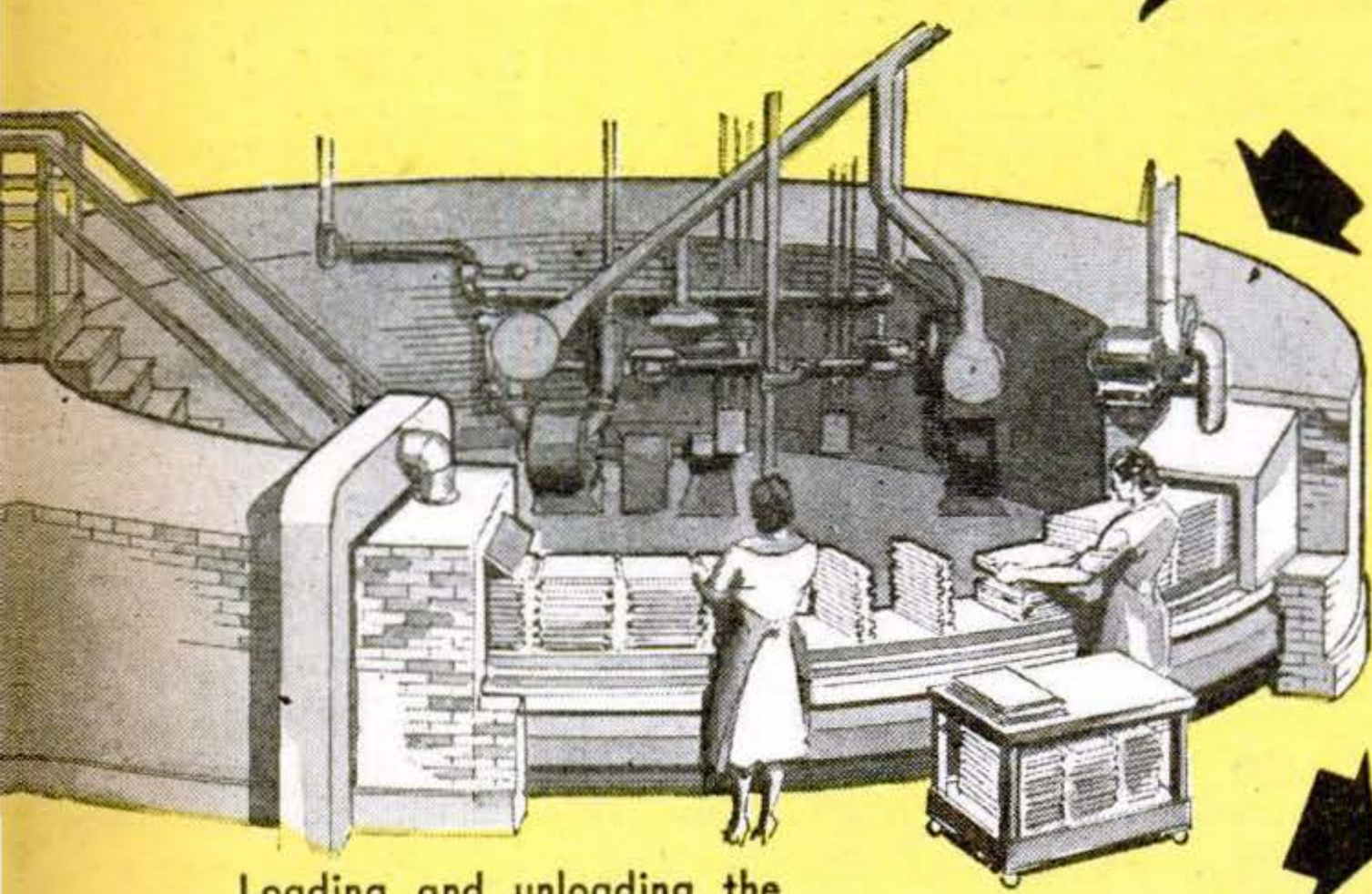
Copyrighted material



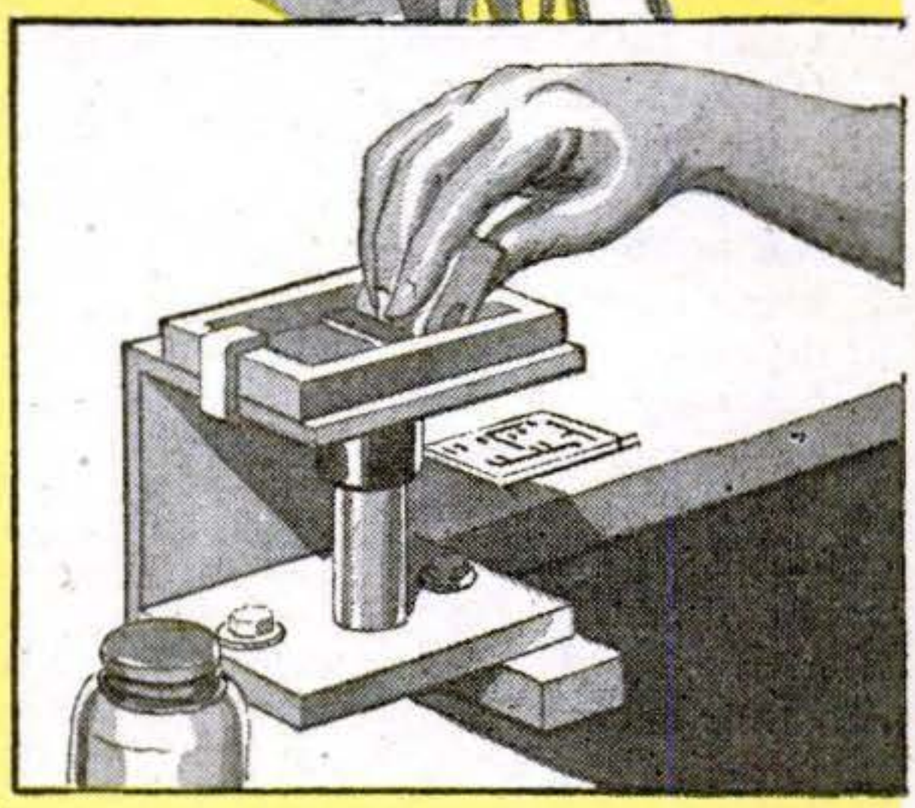
Inside this rotary mixer, talcs, clays, and water are whirled into a smooth mass, from which base plates of calling-card size are made for tiniest radio sets.



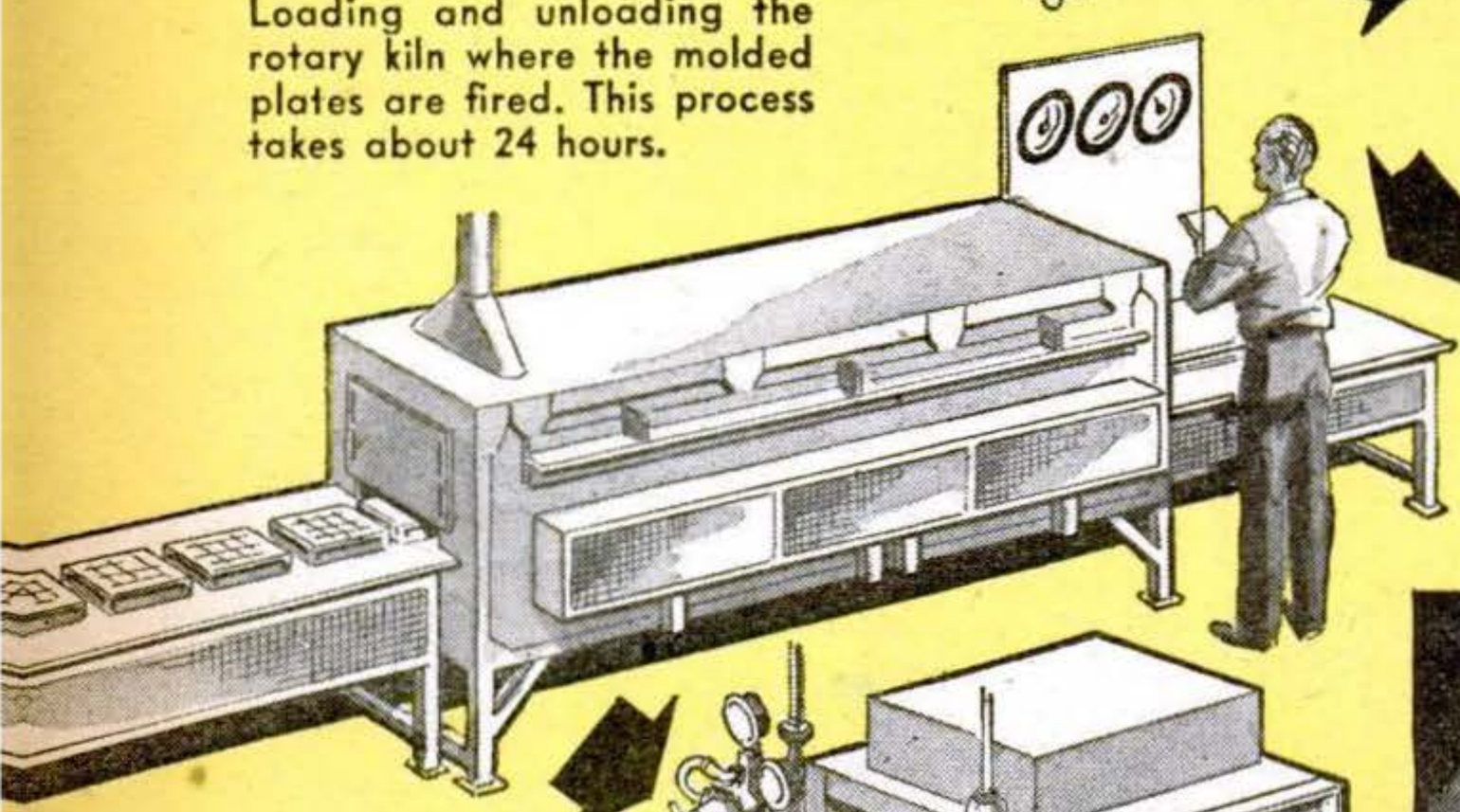
Big double-acting hydraulic presses mold base plates under pressure up to 10 tons per square inch.



Loading and unloading the rotary kiln where the molded plates are fired. This process takes about 24 hours.

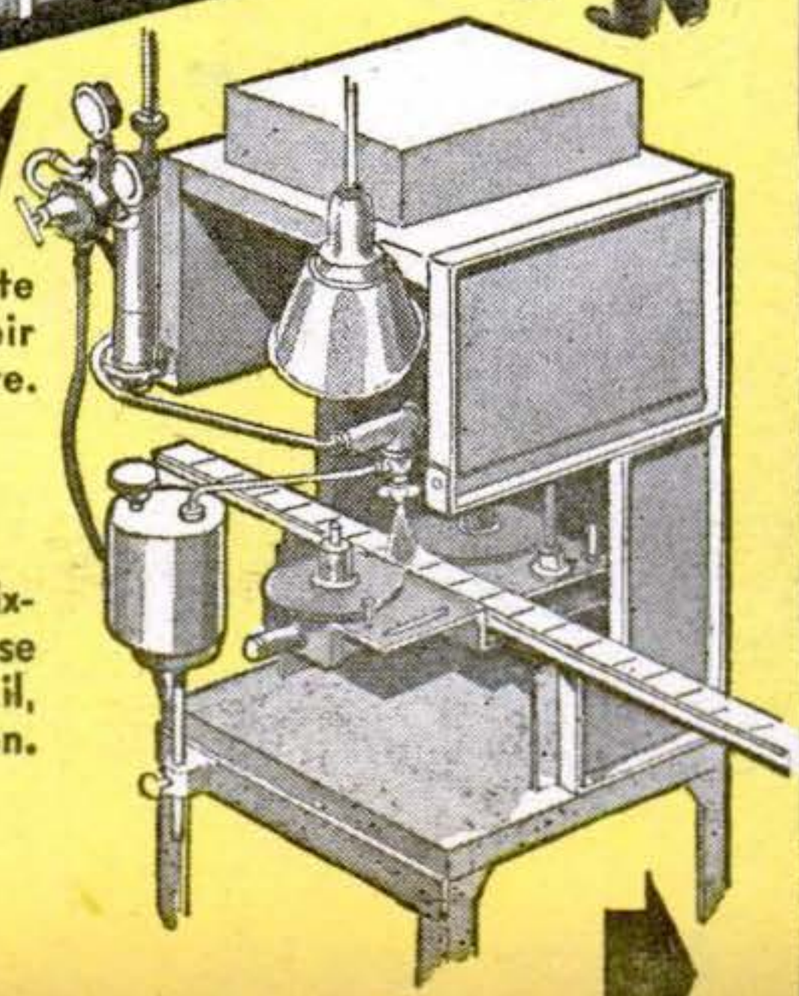


Printing a radio circuit on its base by forcing silver paste through stencilled silk screen with neoprene bar.



Circuits of silver paste are baked firmly to their bases in the furnace above.

A small penlike soldering iron is used to fasten the miniature tube leads to the ceramic base plate.



Resistors of a carbon mixture are sprayed onto base plates through a stencil, then baked into position.

—equal to a blow 10,000 times its own weight. Conventional wired circuits just couldn't take it.

The whole problem was turned over to the National Bureau of Standards, working with the Centralab Division of Globe Union, Inc. Centralab had a lead toward a solution. Before the war its researchers had worked on a way to build capacitors and resistors by bonding silver to ceramics. Now they applied the principle to whole circuits —wiring, capacitors, and resistors all on one ceramic base. It worked; the proximity fuse began smelling out and destroying enemy planes in upper space—and today's printed circuits are available for peacetime uses.

First step in printing a circuit is to make a pattern, which is photographed and printed on a silk screen coated with sensitive emulsion. The portions masked by the pattern are water-soluble and can be washed away, leaving the exposed emulsion on the silk in a stencil pattern of the circuit.

The "ink" is finely divided metallic silver or silver oxide mixed with binders and solvents to form a paste. This is spread on the screen, which is placed on the ceramic base plate. A neoprene bar is then pulled along the screen, forcing the silver through the stencil onto the surface of the plate to print the circuit. The silk mesh makes the deposit uniform throughout. It is fixed in place by baking it at a temperature between 1,300 and 1,500 degrees. The heat removes the solvents and binders and leaves the pure silver bonded to the plate with a tensile strength of about 3,000 pounds to the square inch.

The circuit completed, the next step is to add the resistors. These are also "ink," but a different compound: a conducting material such as finely divided carbon, an inert filler, a binder and a solvent. By combining proper proportions of these elements, and making variations in the dimensions of the resistor, exact resistances can be made ranging from 3 ohms to 200 megohms.

The carbon mixture is sprayed on the base plate through a stencil, and after air drying the plates are again baked, this time at the much lower temperature of 300 degrees. After being coated with resin the resistors are highly stable under heavy loads or high humidity.

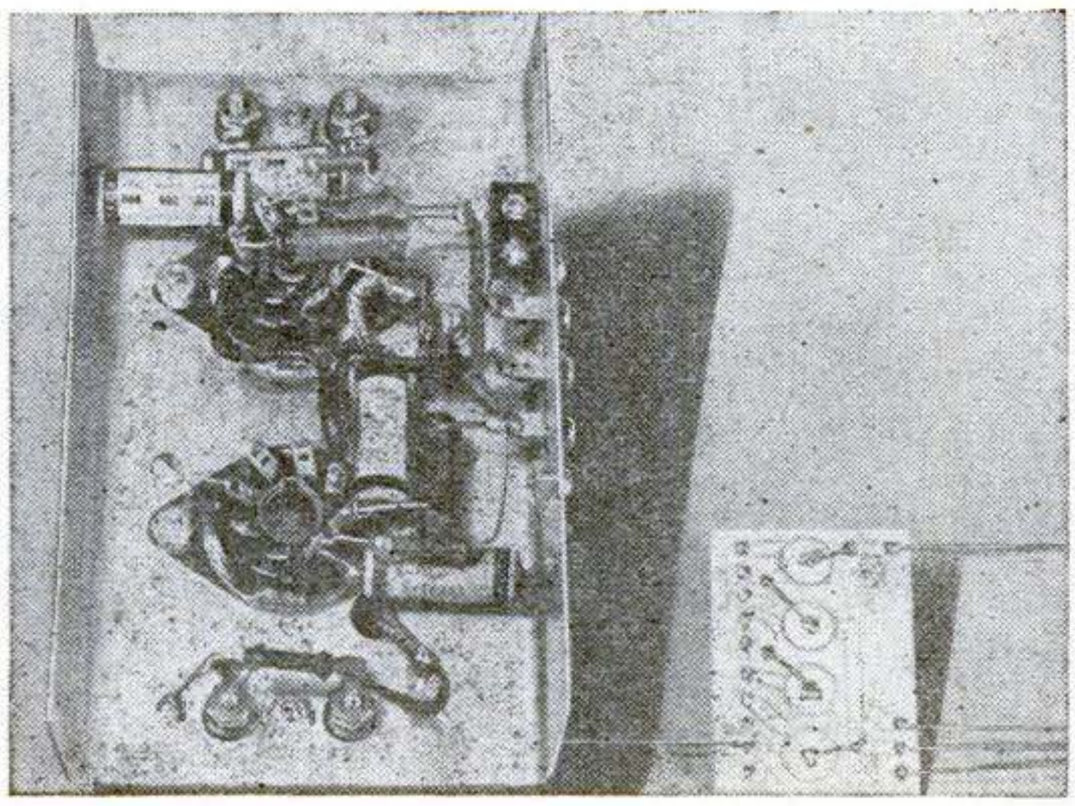
The capacitors or condensers are the third element to be added to the circuit. These are also of a novel type: paper-thin ceramic disks, silvered on both sides and from ⅛ to ⅜ of an inch in diameter. Attaching these tiny capacitors to the base plate is a delicate job. A low-temperature bismuth solder must be used because the heat of normal soldering would crack the thin condenser plates. In addition, two percent silver must be added to the solder to prevent it from absorbing the silver from the base plate.

Since ordinary solder would soak up the circuit, silver solder is also used in the final step, adding the tubes. The new tiny tubes developed during the war, highly efficient, rugged, and with an extremely low filament drain, are used to keep the unit compact.

The plates on which the circuits are printed are made of a ceramic called steatite. When molded, under great pressure, the plates are chalklike. To shrink and harden them, they are dipped in glass-forming materials and fired in kilns at around 2,400 degrees Fahrenheit. When they come out they are hard enough to cut glass. Steatite will not absorb water, solvents or acids even when completely submerged—extremely important for electrical use.

Centralab does not plan to produce complete radio sets itself but rather component parts, including amplifiers, filters, control circuits and small subassemblies, for other manufacturers. Subcircuits printed on plates plugged into the main chassis are as easy to change as a tube. This is particularly important in the export trade: radio repairmen are few in remote areas and a plugged-in circuit that can be bought as a unit, like any spare part, will enable the owner to make his own repairs.

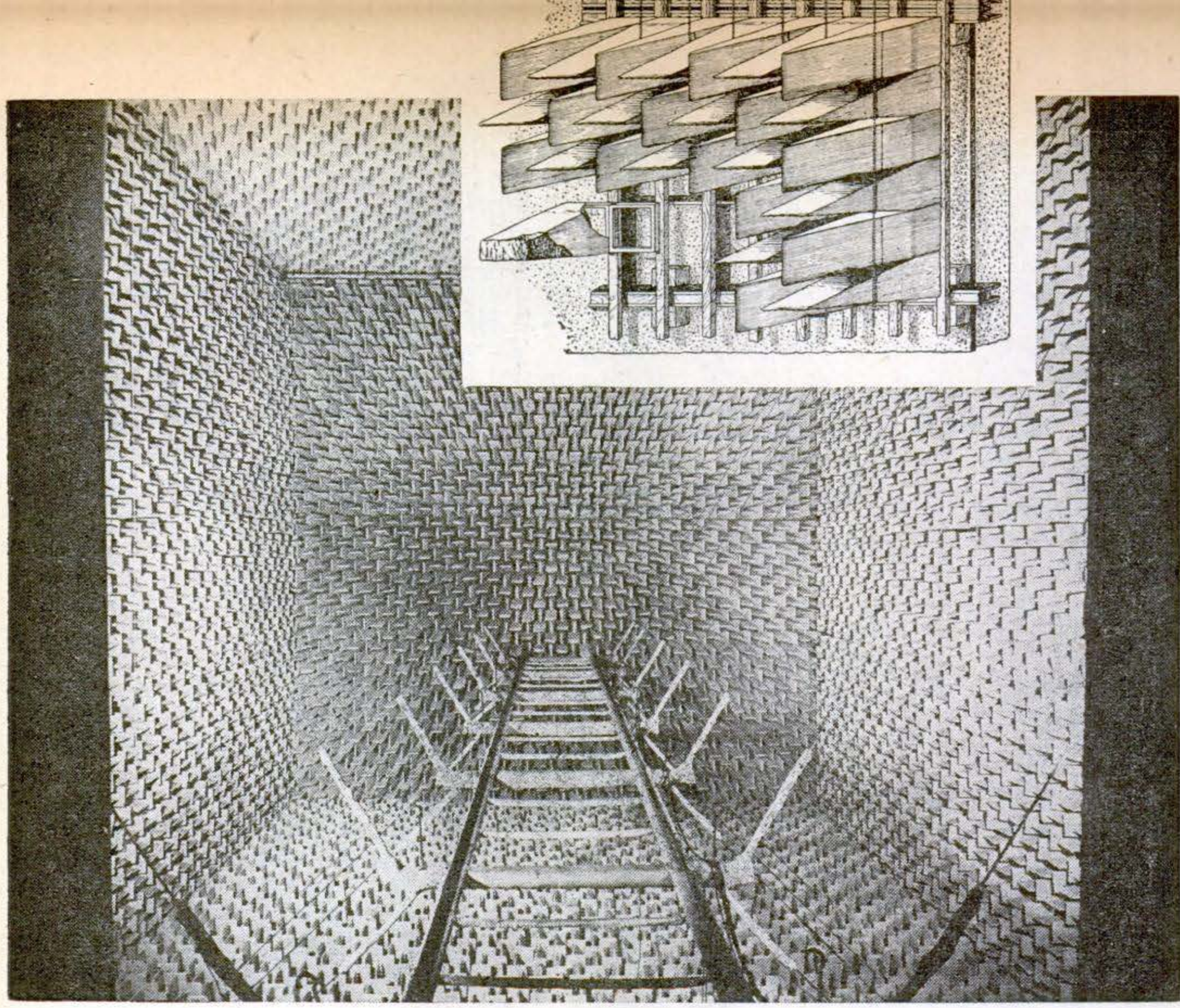
Vest-pocket radio telephones to be carried by individuals still lie in the future but there are many immediate uses for the tiny circuits. Hearing aids can be made far smaller and more compact. Meteorological instruments can be lighter and stronger. Electronic controls of all sorts, in fact, will benefit from the ruggedness and simplicity of the silver circuits, and from the small amount of space they occupy.



**The bottom of a regular radio chassis, with its clutter of wires and parts, contrasts strikingly with the compact base plate of a printed radio circuit, shown at a comparable stage of assembly.**



Copyrighted material



# Echoless Room Lined With 20,000 Wedges

AT PEARL Harbor, lack of good intercommunication equipment and insulation, plus mechanical noises and acoustical tricks of altitude, plagued the Air Forces. Harvard's Electro-Acoustic Laboratory discovered the reasons; then designed and tested new equipment for use in the planes that one general called as helpful as radar.

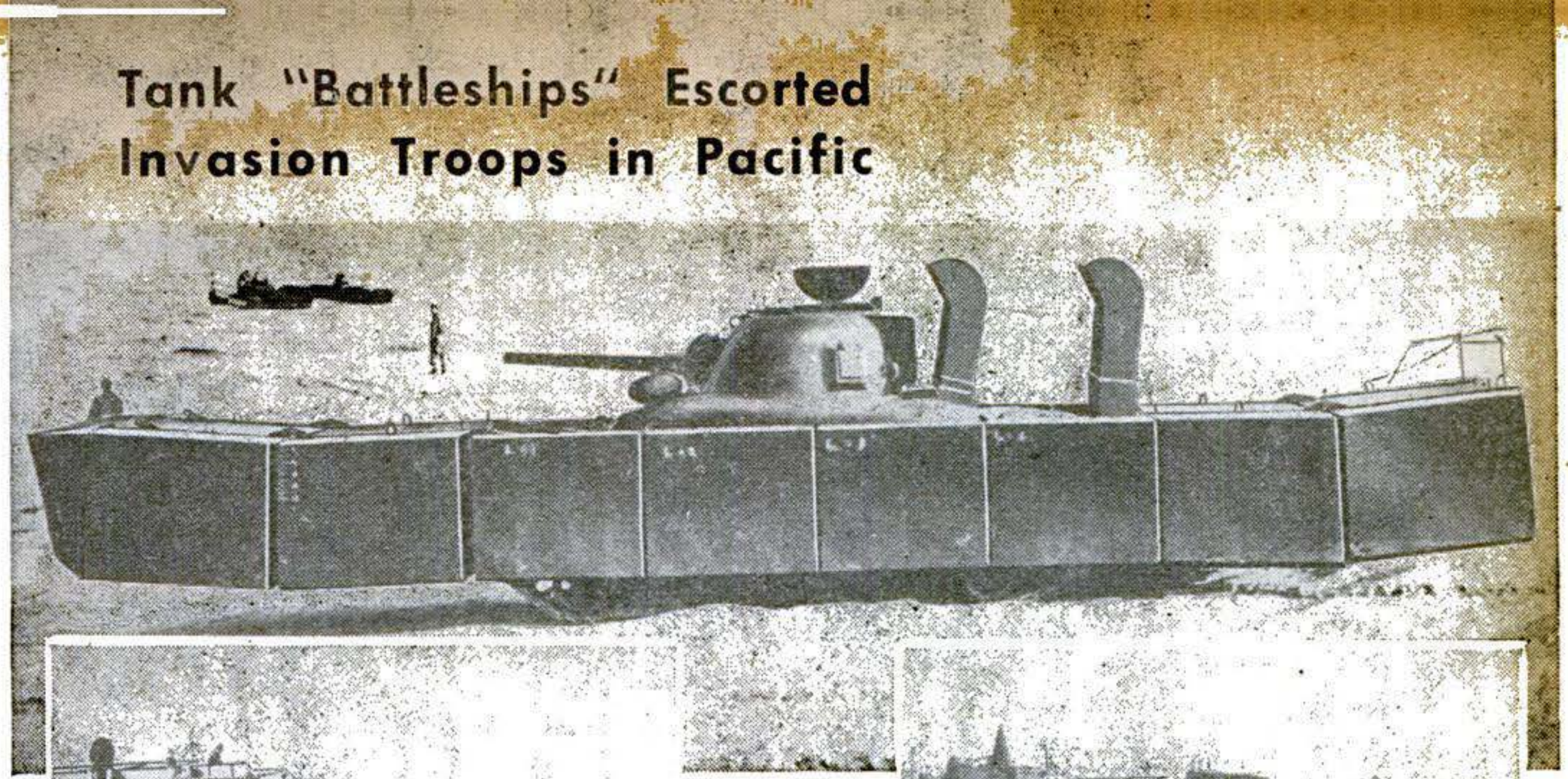
Constructed for research was an echoless room simulating atmospheric conditions at high altitudes; less than 1/1000 of the sound that strikes a wall is reflected. Peacetime acoustics will be improved too by the use of this chamber. Microphones have been calibrated in it for sound measurement.

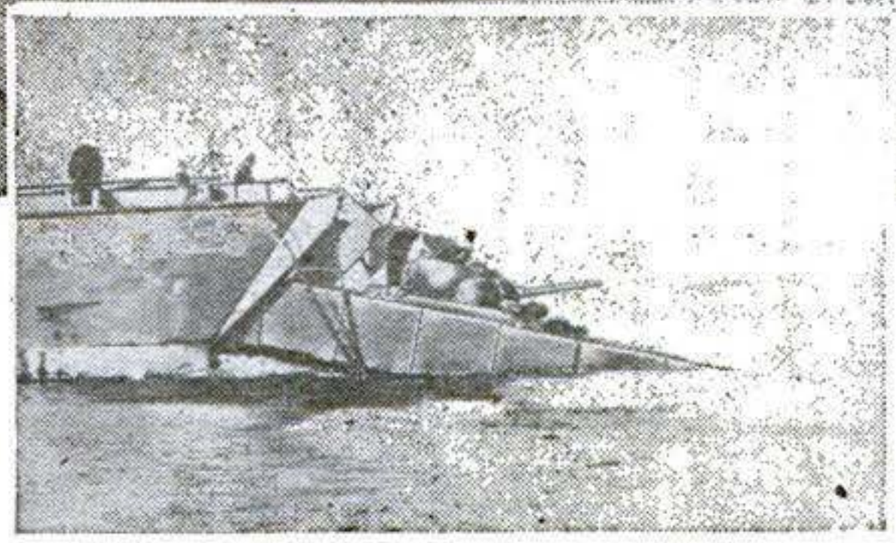
Foot-thick concrete walls, ceiling, and floor are lined with 20,000 Fiberglas wedges covered with muslin bags. Wedges are held 10 inches from the walls by a wooden framework, behind which there is an assembly of fiberboard cells to prevent sound waves from circulating parallel to the walls. Each wedge is set at right angles to its neighbor, and to guard against sagging, it is braced by heavy wire. Track suspended above the floor provides access to cars carrying equipment.

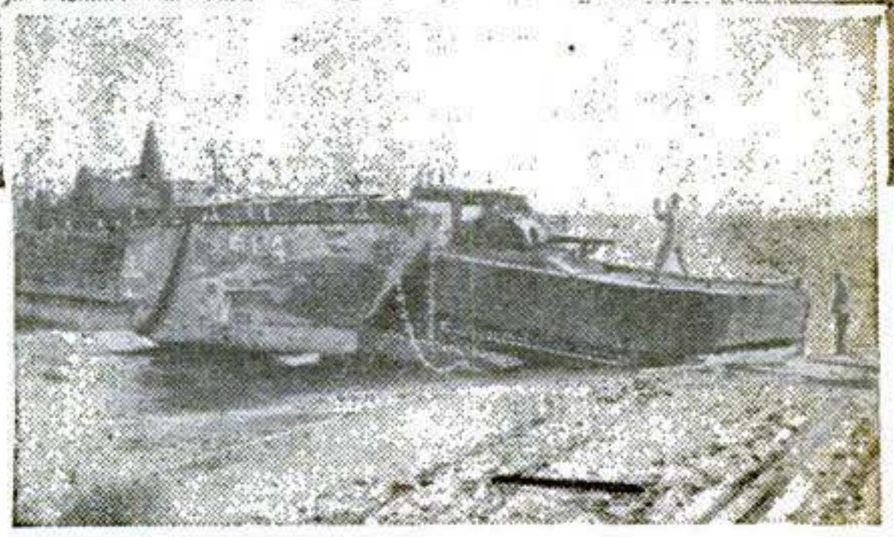
# Electronic Cardiograph Records As It Functions

IMMEDIATE readings of heart action are now possible through the use of the Cardiotron, first direct-writing electrocardiograph. The 34-pound portable instrument is shown here in use. A stylus that works by electrical impulses traces cardiac action on a specially processed paper feeding out of the machine at controlled speeds. With ordinary care, the records are permanent.

# Tank "Battleships" Escorted Invasion Troops in Pacific



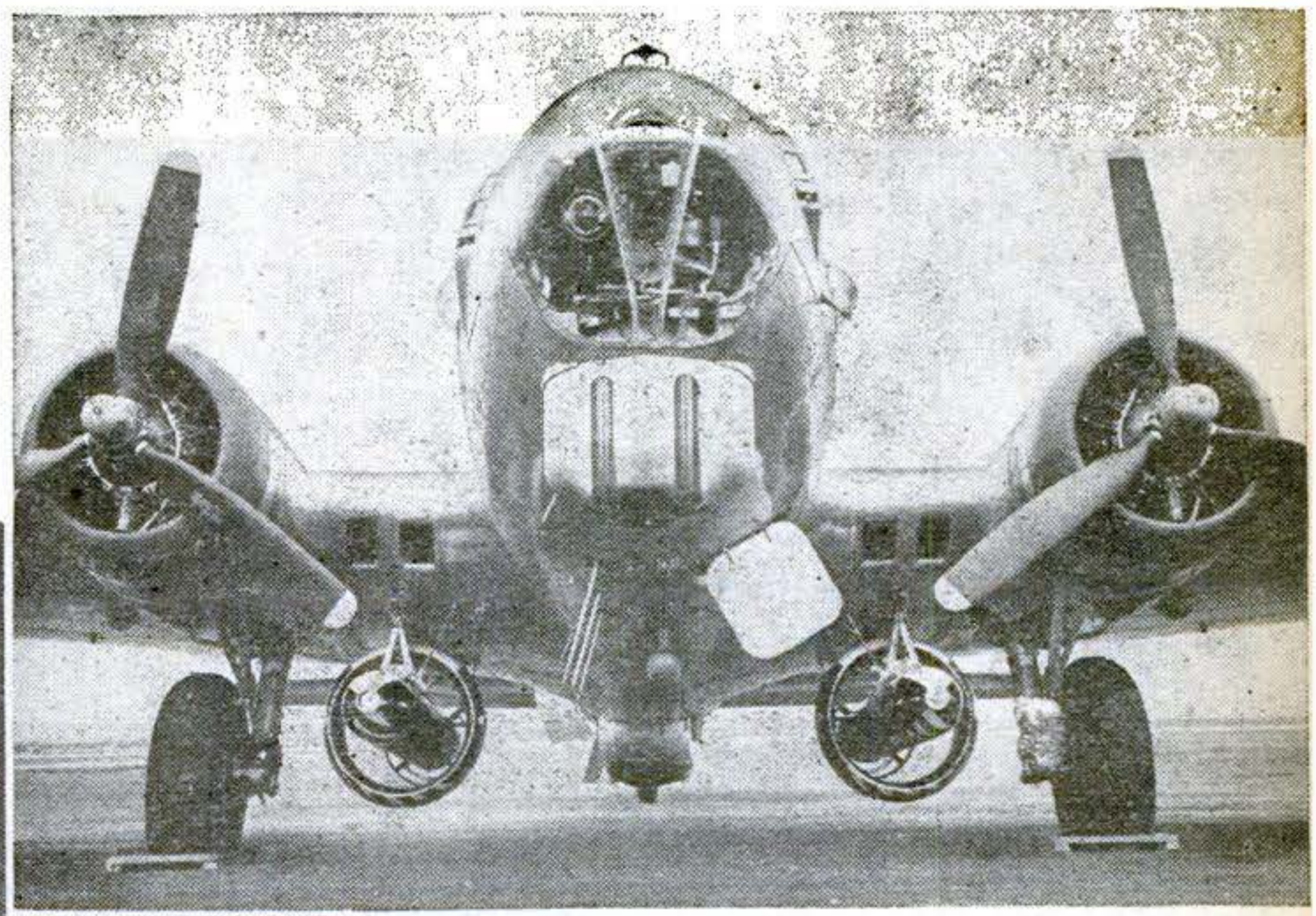




Supported by rigidly attached steel pontons each filled with rubber sponge, 30-ton Army tanks became tiny battleships that swam ashore from landing craft firing their turret guns to support beachhead invasion troops in the Pacific. First used at Okinawa and manned by U. S. Marines, the unorthodox warships are now disclosed to have waddled through heavy seas at 5½ miles an hour. The tracks propelled them. On hitting the beaches, the girdles of pontons were blasted loose by explosive rivets controlled by the tank crews, enabling the tanks to pitch into the battle on land. Motor exhaust gases were carried off by the ventilators that stick up like periscopes. The Carrier Corp., Syracuse, N. Y., peacetime makers of air-conditioning units, sped production of 500 "swimming" tanks.

# Missiles *that find the LIGHT*

Shown here are two forms of the uncanny "Roc," the flying radio bomb with the television "eye" (PSM, Feb. '46, pp. 84 and 120). Photoelectric target seekers in the bomb's nose detect a light and direct the killer to it.

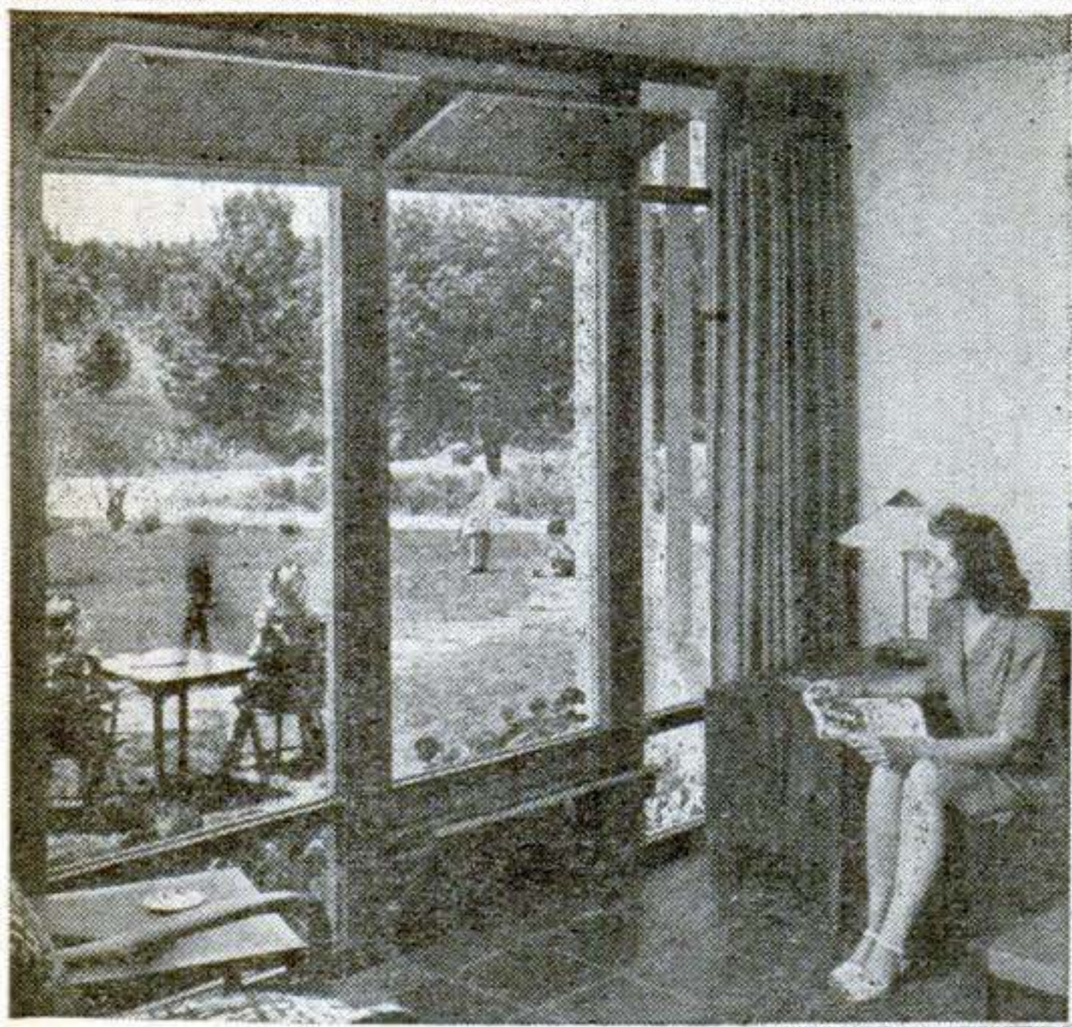


How two of the shroud-winged "Rocs" nestle under the wing of a Flying Fortress is shown above. Television shows bombardier where each 1,000-pounder is going and he steers it by radio. First "Rocs" perfected had four wings, carried 500 pounds of explosives. In a test, one of them landed (left) within 25 feet of magnesium-flares target.

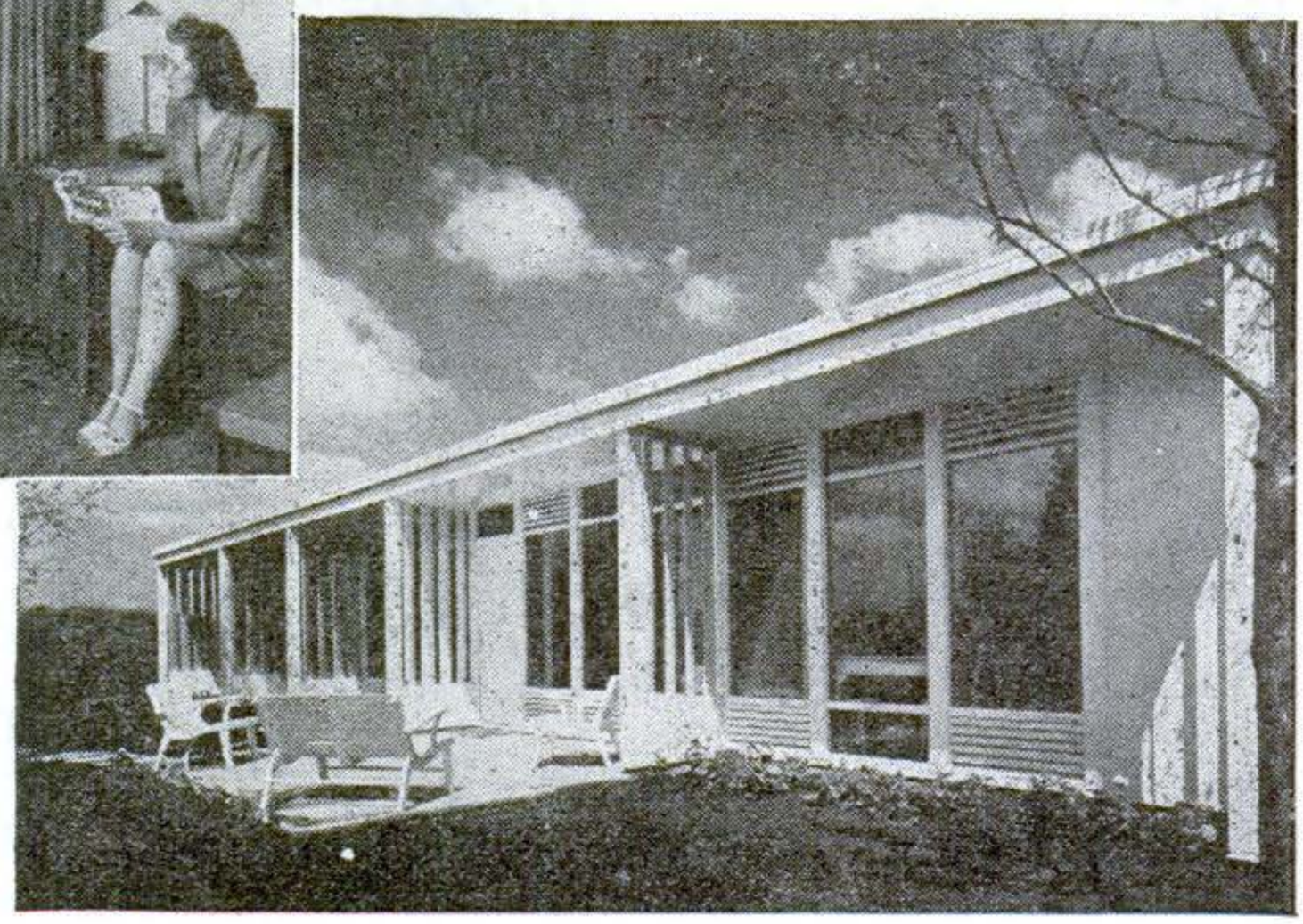


Copyrighted mate

# HOME OWNERS



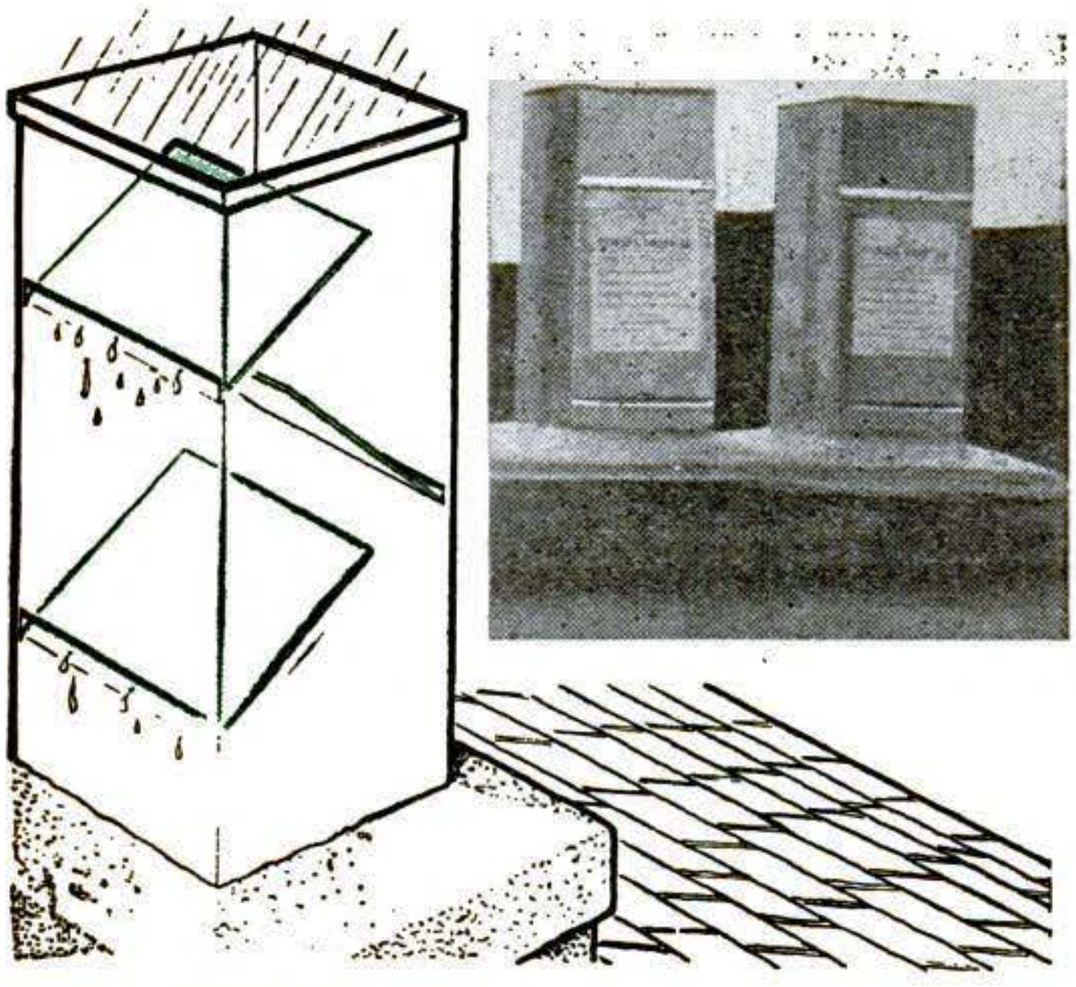
**PREFABRICATED SOLAR HOUSES** combine two currently popular ideas in home design. The one shown here is manufactured in standard wall, partition, and roof-panel units by Green's Ready-Built Homes, of Rockford, Ill. Units can be adapted to a variety of one-story floor plans. No basement is used, the homes being put up instead on poured concrete foundations. They have tile-duct floors for thermostatically controlled warm-air radiant heat from a gas furnace in the utility room.



Long, fixed windows with panel openings for fresh air above and below provide plenty of sunlight in the prefabricated solar home.

They are on the south side under wide eaves that admit sun only in winter. Insulated double panes make storm windows unnecessary.

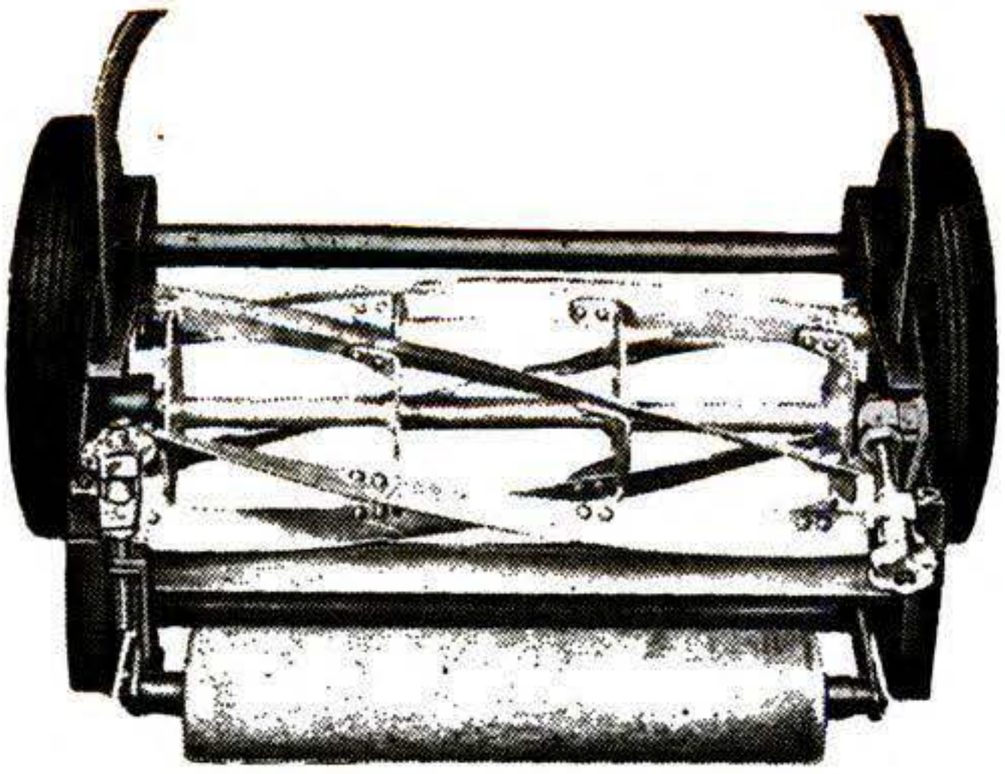
**BAFFLES IN A NEW CHIMNEY CAP** deflect both rain and cold-air downdrafts. Each of the three baffles in the cap shown below leads to a louver, thus providing outlets for water and wind before they can reach the chimney proper and cause dampness or irregularity of draft. The caps are made by Alois Steiner, of Hoboken, N. J. They are available in three sizes ranging from 6½" to 8½" square and will fit most standard chimneys.



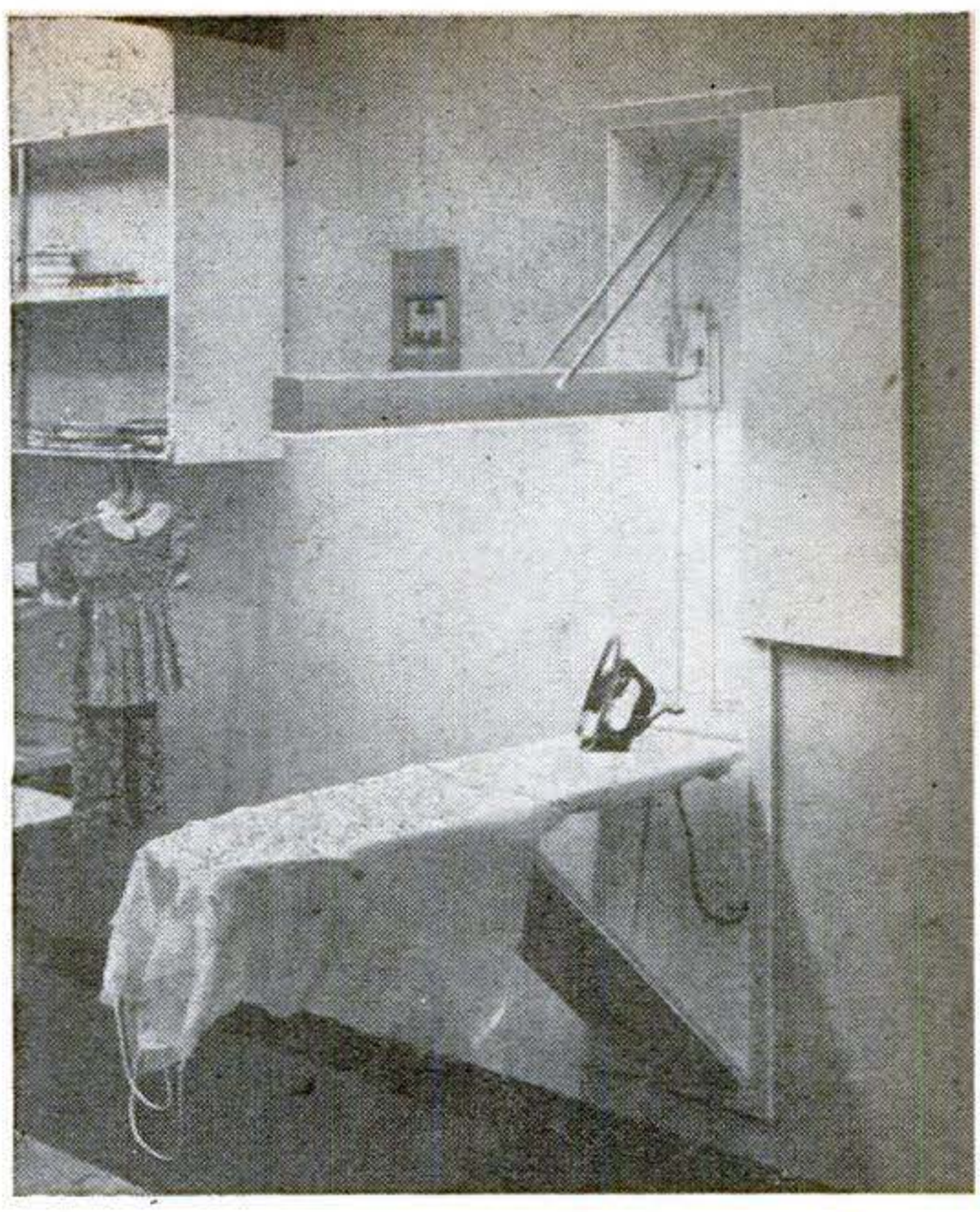
**PROTECTING LINOLEUM** is easy with a new liquid said to make periodic waxing unnecessary. It is applied with a medium-wide brush and dries in an hour. According to the manufacturer, the Wesson Houseware Products Company, of Chicago, the finish acts as a preservative on the linoleum and will withstand many washings.

**PIPE JOINTS ARE SEALED** without messiness by use of a new joint compound in stick form. Three or four strokes of the stick across the threads are sufficient. The substance spreads when the connection is threaded on and, besides sealing, acts as a lubricant and rust retardant. It can be used also on nuts, gaskets, and the like. The Lake Chemical Co., of Chicago, is the maker.

Copyrighted material



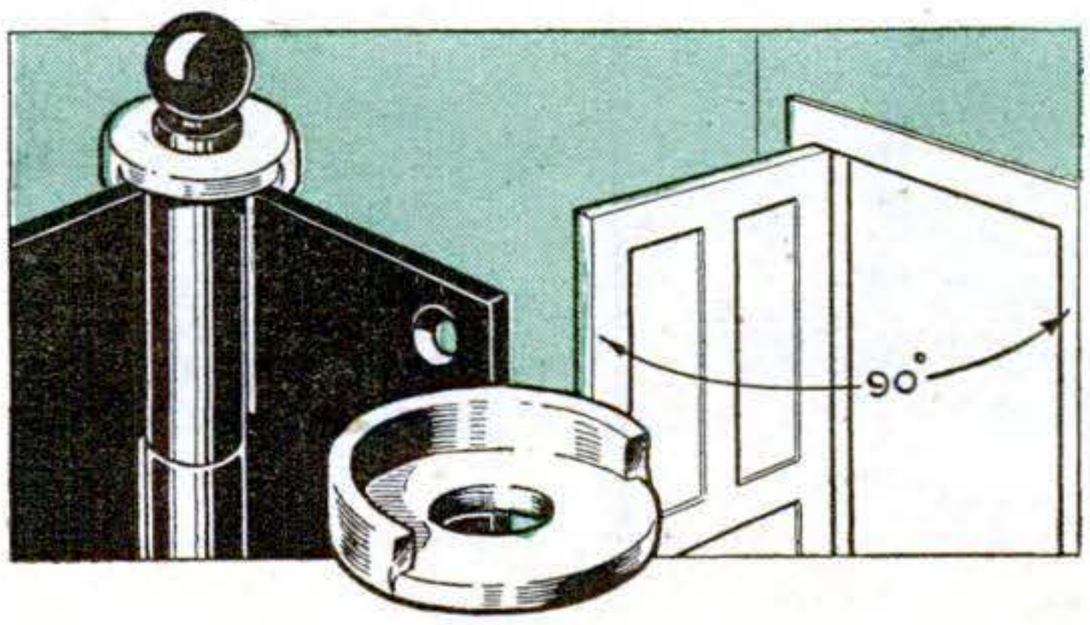
**QUICK-ADJUSTMENT KNOBS** requiring no wrench or screwdriver are provided on the 17" lawn mower shown above. The two knobs are at the ends of the blades. One connecting with a leveling device adjusts the height of cut, and the other provides adjustments as fine as .001" for clearance between the blades and bottom knife. The mower, known as the Michigan Noiseless, is a product of the new lawn-mower division of Reo Motors, Inc., of Detroit.



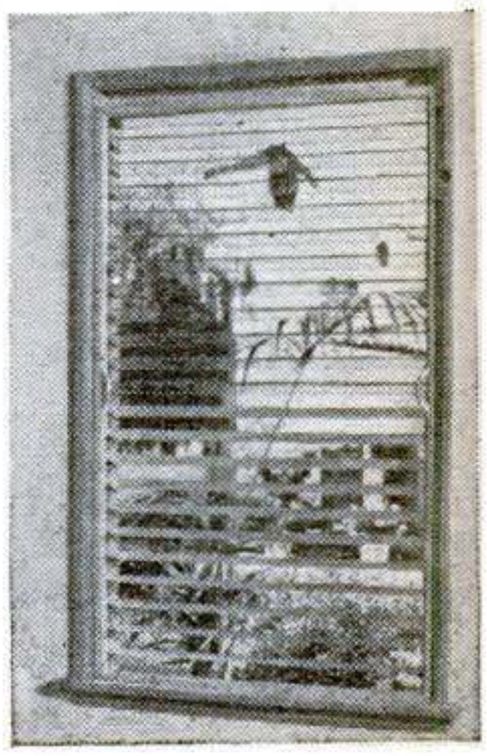
**LIGHT FOR IRONING.** This pivoted fluorescent unit swings out from the same wall cabinet that houses the ironing board, and gives well-located, shadowfree illumination. It was developed by Myrtle Fahsbender, director of home lighting for Westinghouse, and is installed in the John Wanamaker "Home of Vision" exhibited this spring in New York and Philadelphia.

**PREASSEMBLED HOUSES** are now being shown in department stores and sold like furniture. Parts of the prefabricated house shown at left are assembled first with precision jigs in the Johnson Quality Homes plant to assure accuracy. It is on display in the Wanamaker stores.

**BANGING OF DOORS** against walls or doorstops doesn't occur with this washer that limits the opening to 90 deg. It is installed on the pin of the top hinge. Motion is restricted when the hinge leaves come in contact with the raised portion of the washer. The device is made by Door Stop-Nut, Inc., of Chicago.



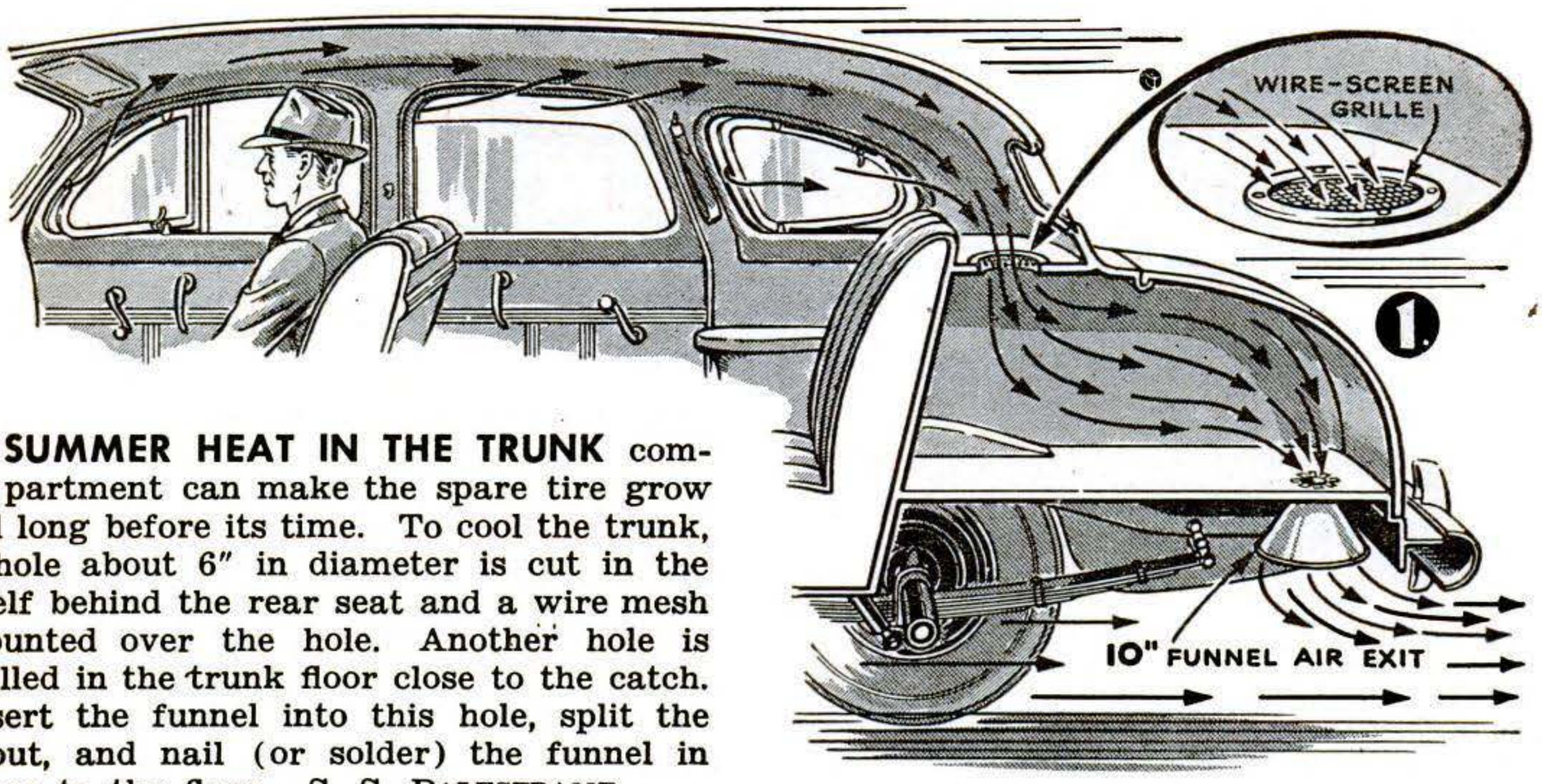

**VENETIAN-BLIND WINDOW PANES** permit home ventilation without draft. The panes look like and operate like Venetian blinds, but they are made of window glass, clear for ordinary use or frosted for privacy in bathroom or bedroom windows. Sizes are standard for installation in windows or doors of new or old homes. Lyle Bishop is the inventor of this Bishop Venta-Glass window, and the Nu-Air-Wa Company, of Los Angeles, distributes it. When closed it is watertight.





Copyrighted material

# USEFUL AUTO HINTS

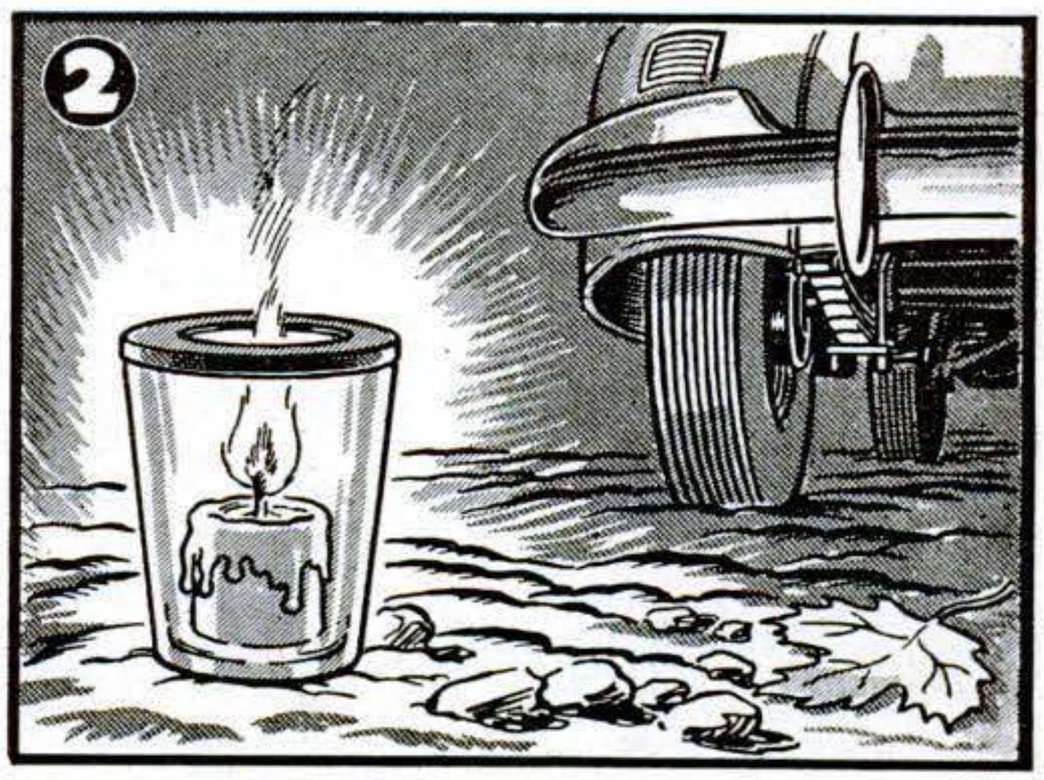



**1 SUMMER HEAT IN THE TRUNK** compartment can make the spare tire grow old long before its time. To cool the trunk, a hole about 6″ in diameter is cut in the shelf behind the rear seat and a wire mesh mounted over the hole. Another hole is drilled in the trunk floor close to the catch. Insert the funnel into this hole, split the spout, and nail (or solder) the funnel in place to the floor.—S. S. PALESTRANT.

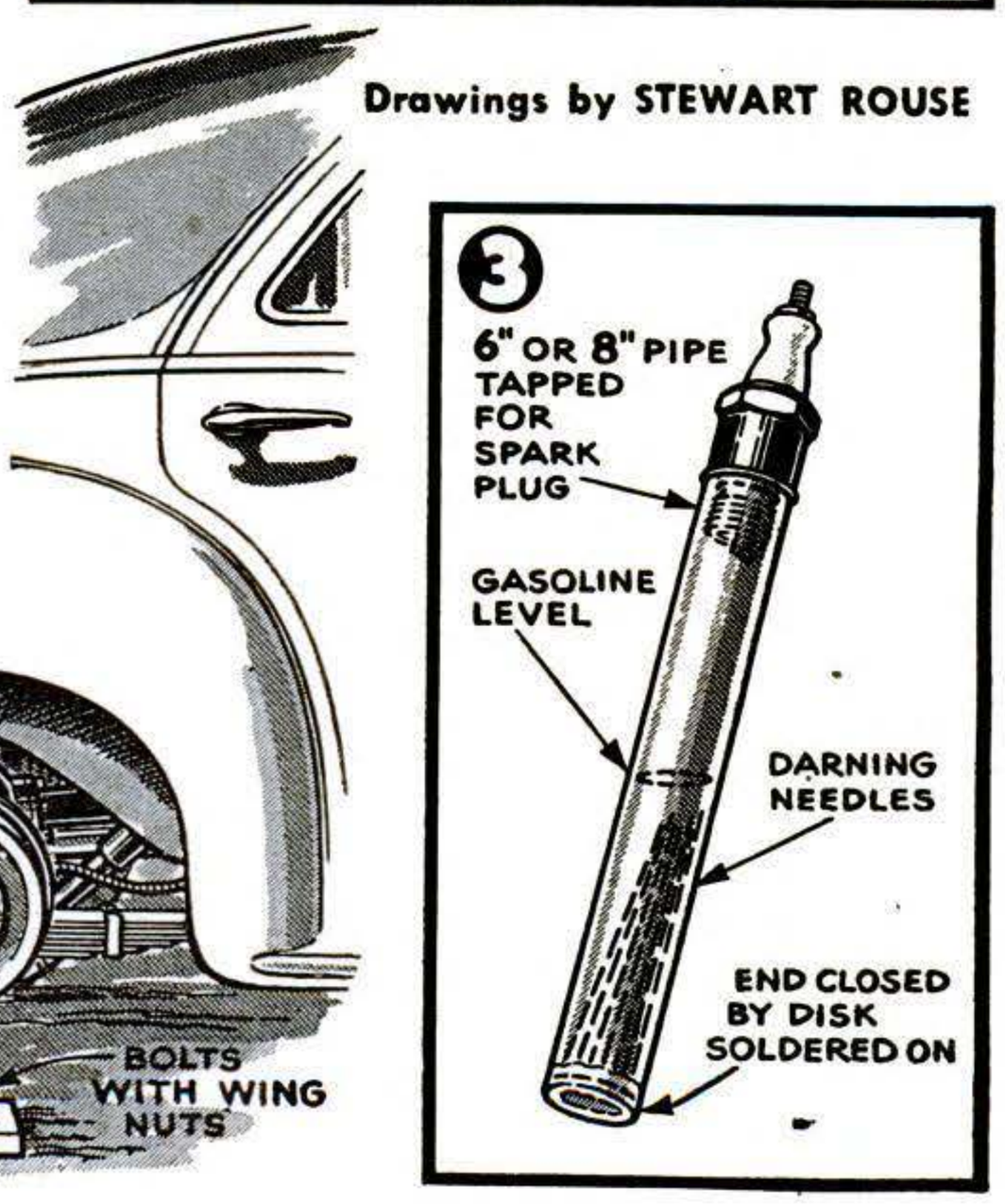
**2 ROADSIDE FLARES** are worth carrying even though you may rarely need them. A simple flare can be made from a jelly jar and a stubby candle. Cut a hole in the jar top and put in a candle.—KEN MURRAY.

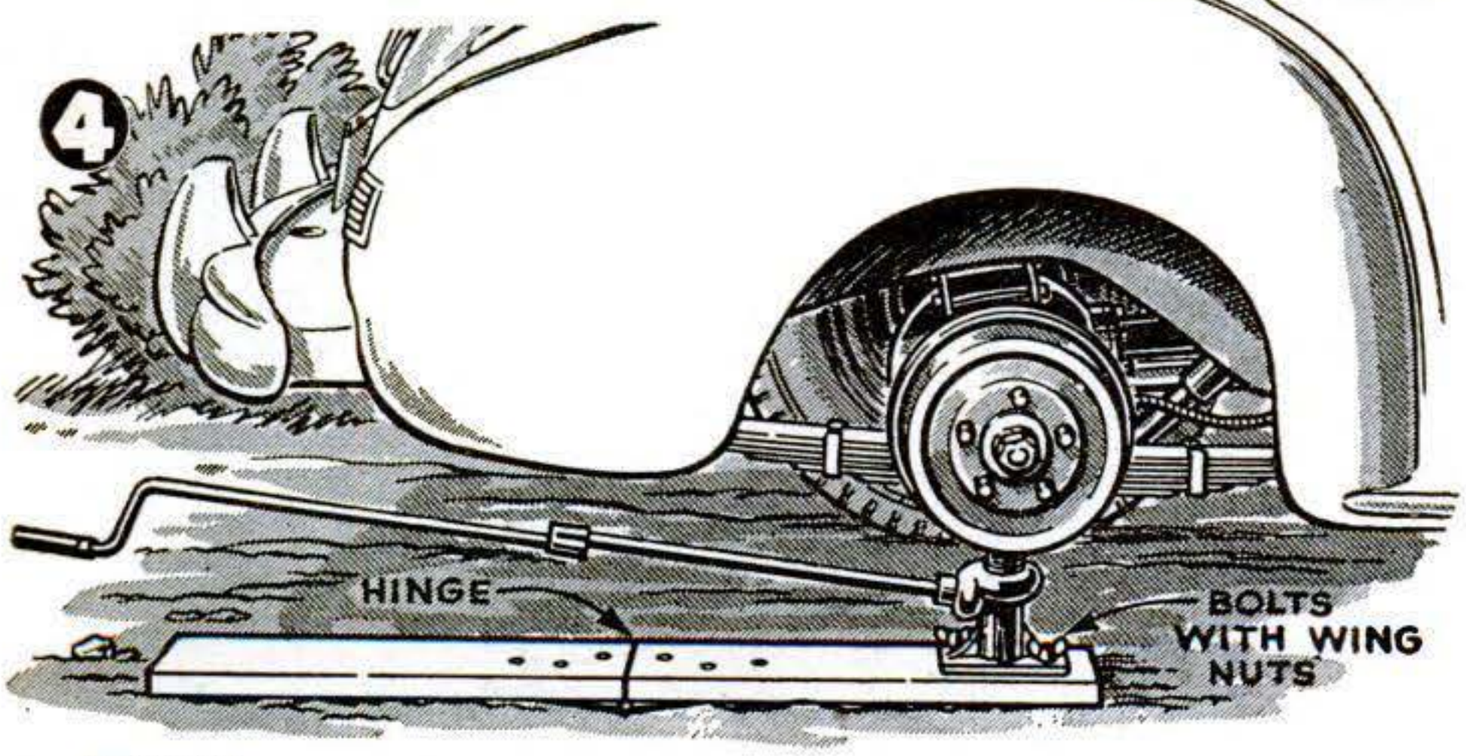
**3 CLEANING SPARK PLUGS** is as easy as shaking a stick with the gadget shown at the right, and done the same way. The pipe is tapped at one end to fit the plugs, and closed at the other. Put in some darning needles and a little gasoline and shake briskly.—I. J. STRETTEN.

**4 FIXING A FLAT** when you have an axle jack usually means reaching far under the car. One way to avoid this is to bolt the jack to a narrow board, or to one of two boards hinged together to make it easier to stow them in the tool compartment. The hinge can be placed facing down as shown here, or up.—D. K. ABELS.



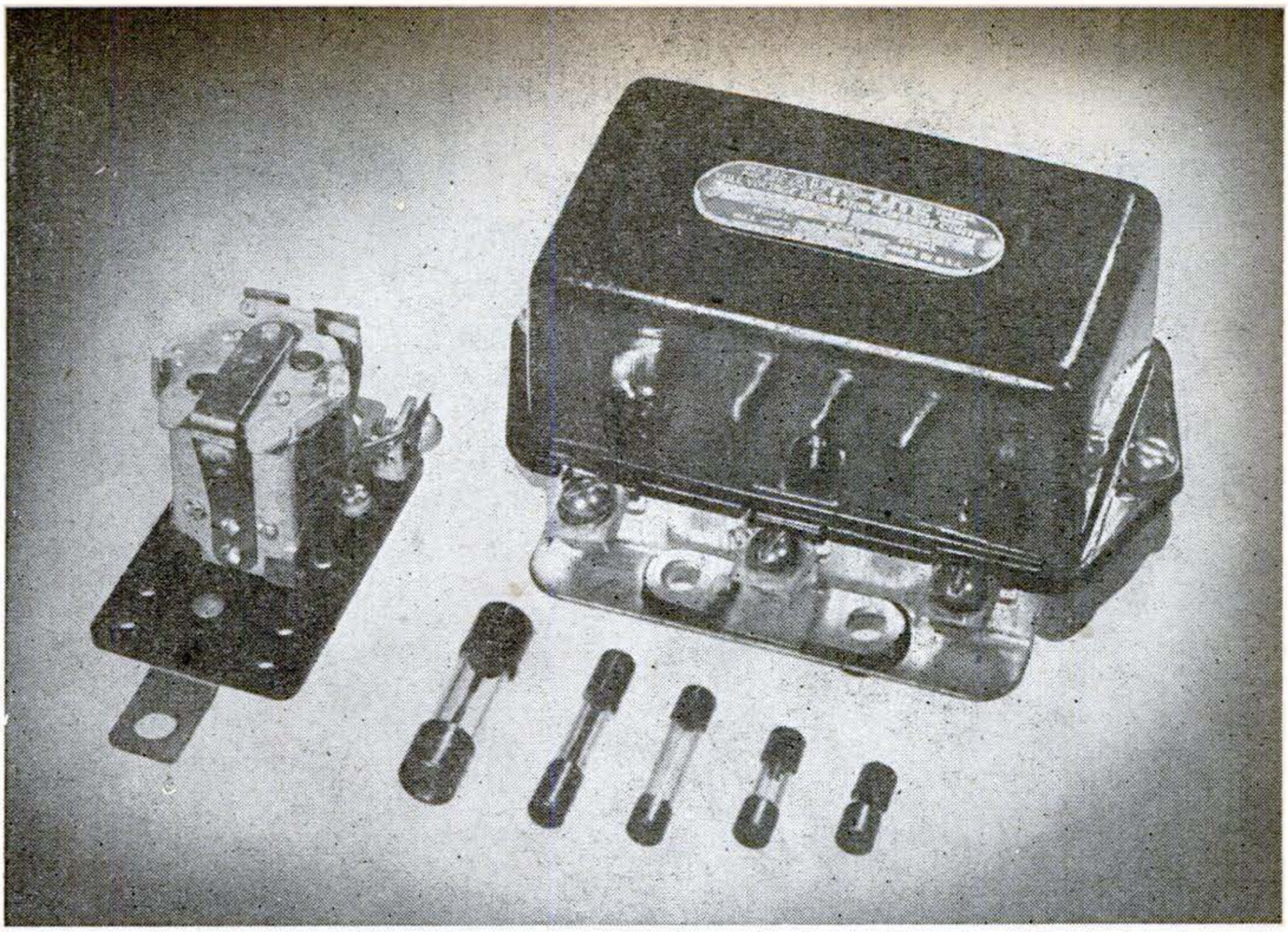

Drawings by STEWART ROUSE






Copyrighted material



Fuses or a circuit breaker (left) and a generator regulator stand guard in automobile electrical circuits.

# Electrical Safety Valves Protect Your Car

By WILLIAM H. CROUSE

AUTOMATIC controls are as essential to the electrical system of a car as a safety valve is to a boiler. In the absence of fuses or circuit breakers, short circuits could cause serious damage or fire. Without such protective devices as voltage and current regulators, both the generator and battery would be constant troublemakers.

A cutout relay, a voltage regulator, a current regulator—the three magnetic switches that usually are designated collectively as a generator regulator—and a number of fuses comprise the main safety valves in the electrical system of most modern cars. In some, circuit breakers or thermostatic relays perform the function of fuses.

There was a time when comparatively small demands were made on an automobile's electrical system, and a third-brush generator could do the job. In these generators, the maximum output is easily controlled by adjusting the third brush. But as electrical accessories were added and the output was stepped up (as it had to be), battery overcharge and high voltage resulted, particularly on long trips. To overcome these tendencies, a system known as step-voltage control was adopted. This consists of a cutout relay and a step-voltage control unit, the latter being a magnetic switch operating much like the former.

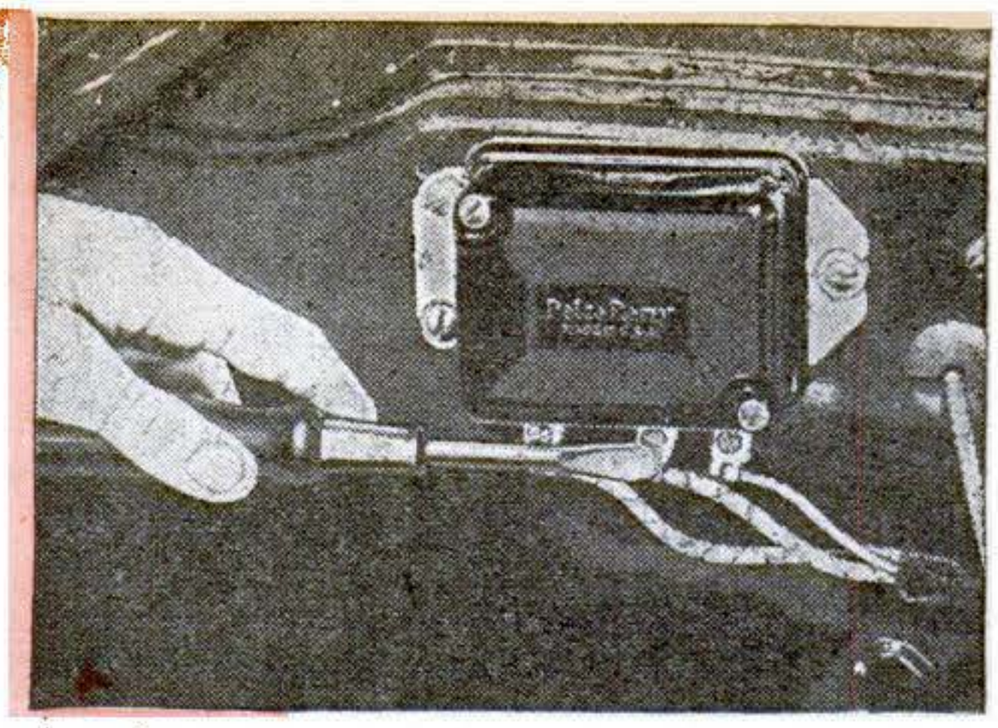
Third-brush generators, however, are slow in reaching their maximum efficiency, and at higher speeds the output tapers off. They have now largely given way to straight shunt generators, with which a cutout relay, a voltage regulator, and a current regulator are usually all employed.

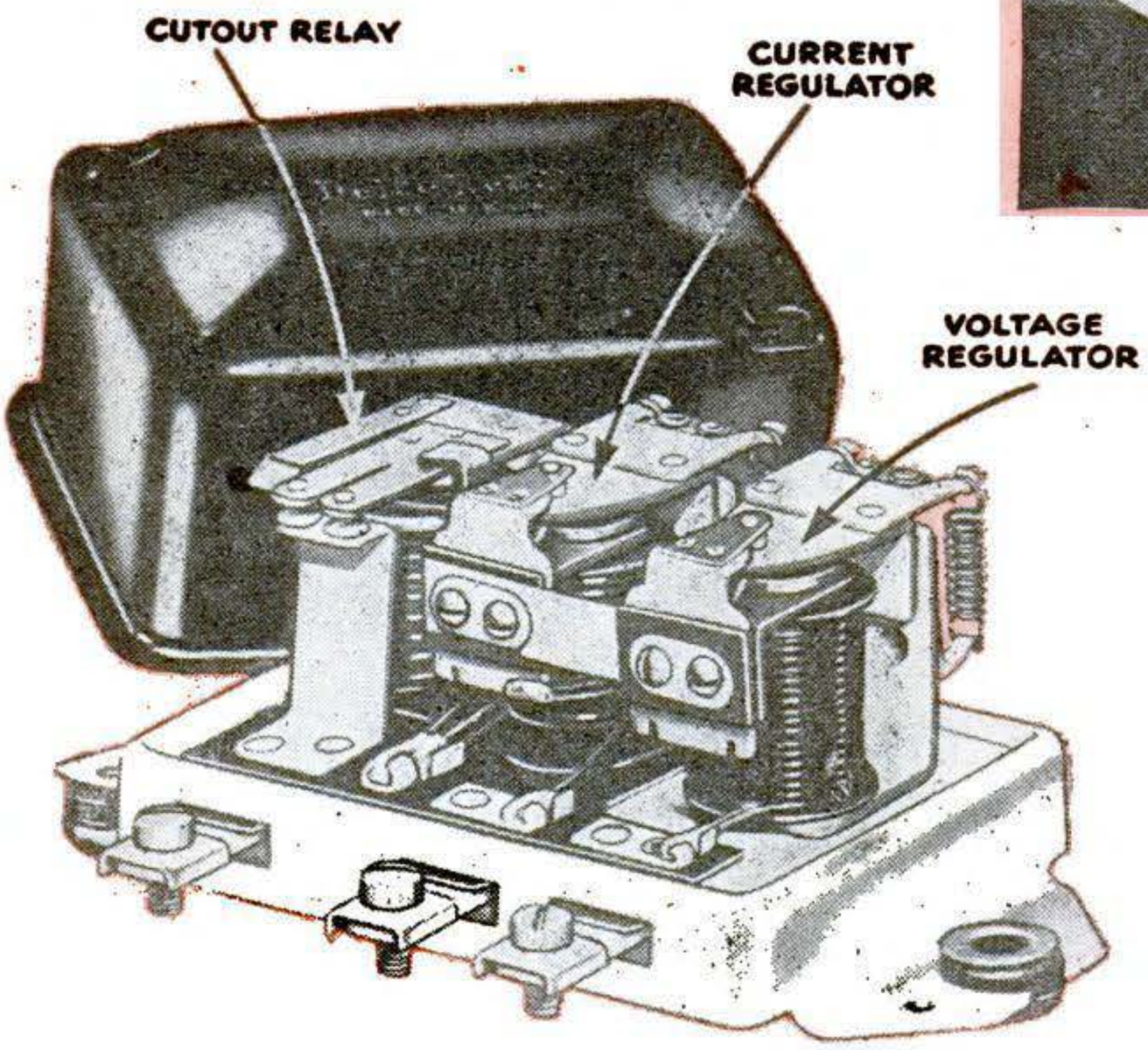
A cutout is the policeman that keeps the generator-battery circuit a one-way street. When the generator is delivering current, the contact points in the relay close magnetically, allowing current to flow to the battery. When the output drops off to the point where current would flow back from the battery, the contact points automatically open. The voltage regulator, as its name indicates, prevents the generator from directing too large a voltage at the battery and overcharging it. Likewise, the current regulator keeps the generator from exceeding its maximum rated output.

Erratic ammeter action, a rundown battery with a low charging rate, and a fully



Copyrighted material





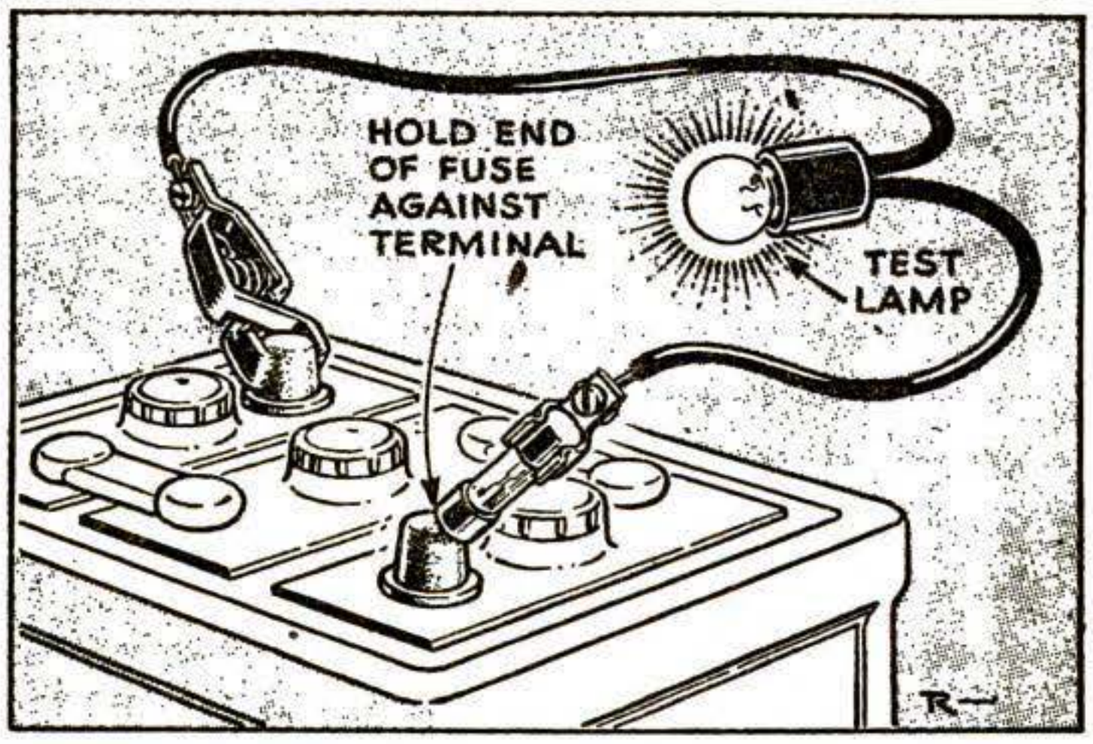

A screwdriver placed across the generator and battery terminals of a Delco-Remy regulator, above, polarizes the generator correctly. As indicated by the drawings at the upper left, a jumper lead is needed for this task on other types.

charged battery with a high charging rate all are likely signs that there is something wrong in the regulator. With a low battery, the charging rate should of course be high. If the rate is low, first check the leads and connections between the generator and battery, for if these are defective a normal charge cannot reach the battery. Clean any corrosion from the cable connections at the battery terminals with steel wool, tighten the cable clamps, and coat the terminals and clamps lightly with vaseline to retard corrosion at these vital points.

If the charging rate remains low, there may be a defect in either the regulator or generator. To determine which is at fault, operate the generator at a medium speed and momentarily connect the field terminal of the regulator to the regulator base or to the generator terminal with a screwdriver or jumper lead, making the connections according to the type of unit. On Auto-Lite and Delco-Remy passenger car regulators the field terminal should be connected to the regulator base for the test, but on Ford regulators the field terminal should be connected to the generator terminal. If the output increases considerably when the connection is made, the regulator is at fault. Otherwise, it probably is the generator.

Many regulators are factory-sealed to discourage random tinkering, for such attempts often cause more harm than good. But in the absence of a trained serviceman, there are some repairs you can make provided you treat the regulator like the delicate instrument that it is. (See P.S.M., Nov. '43, p. 128). If you find, for instance, that a half-charged battery is not receiving enough current from the regulator, it may be that cleaning the contact points will clear up the trouble. First, remove the lead from the battery terminal of the regulator to avoid grounding the battery side of the circuit. Then clean the points with a few strokes of a thin, fine-cut contact file and pull a strip of clean linen between them to remove filings. Take care not to disturb any spring-tension adjustment.

Should there be any doubt whether a fuse is good, this testing rig will quickly show whether it is.

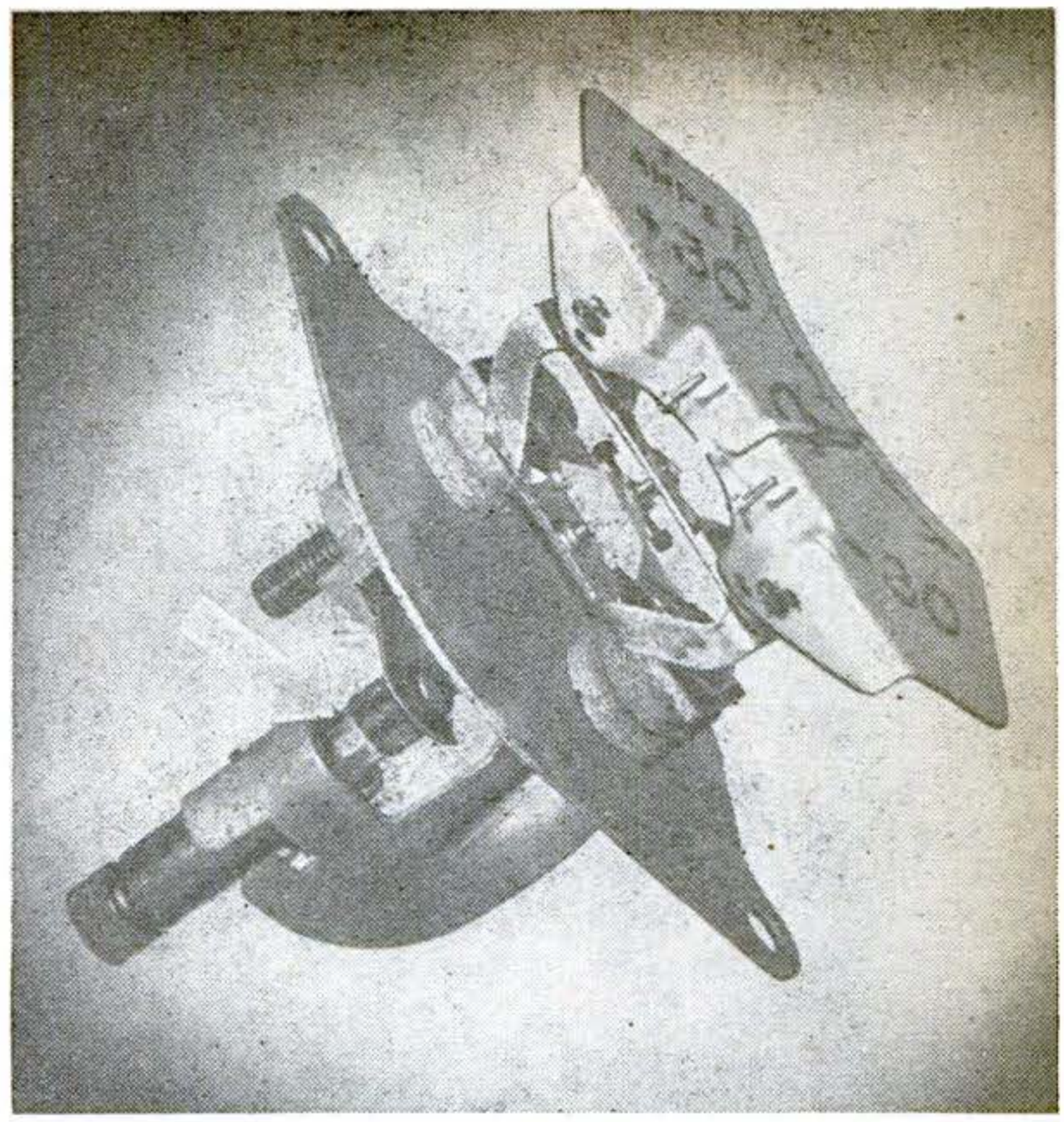





Copyrighted material

When the charging rate is high with a charged battery, operate the generator at a medium speed to obtain a high charging rate and then disconnect the lead from the field terminal of the regulator. This opens the generator field circuit. If the charging rate drops off, the regulator has an internal short or ground or is improperly set and will require replacement or adjustment. If the charging rate remains high, the generator probably has a short or ground.

As a final step in any repairs in which generator or regulator leads have been disconnected, it is important to see that the generator has the correct polarity before the engine is started. This can be done by connecting a screwdriver or jumper lead momentarily between the battery and generator terminals of the regulator after all leads are connected. This permits a brief flash of current to flow from the battery through the generator and polarize its field magnets correctly.



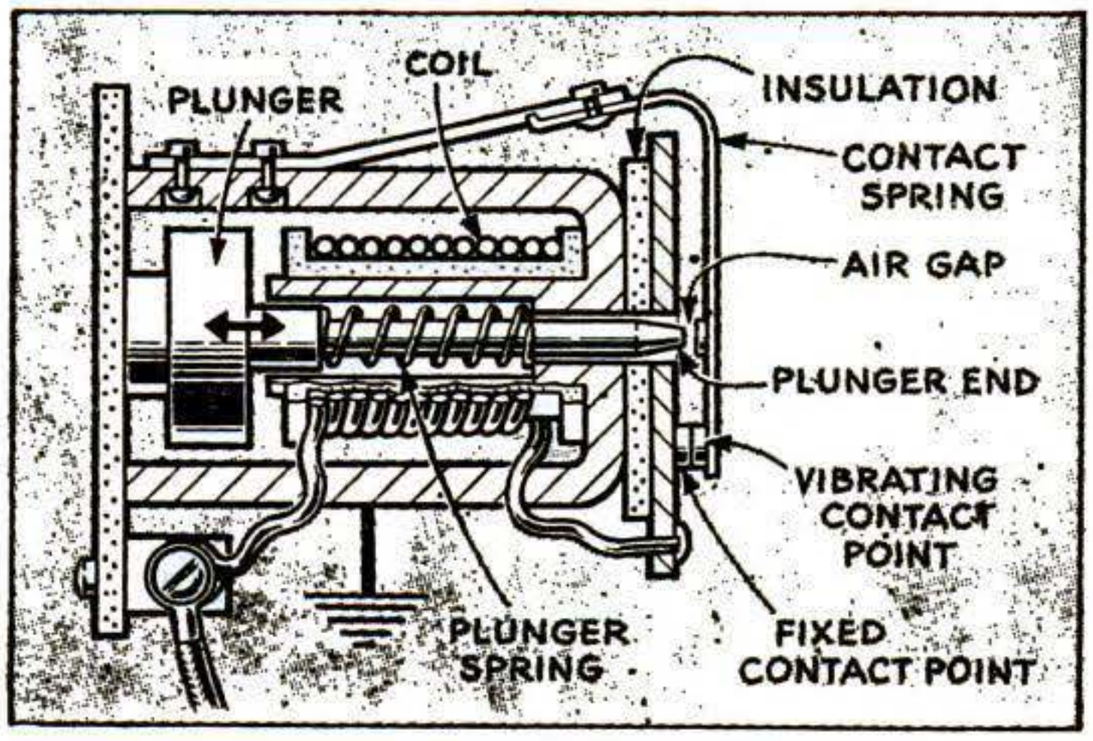
Your dash ammeter probably will serve notice of defects in any low-voltage circuit. Above, the arrow points to the fuse.

Two types of fuses are employed in motor vehicles. Some are visible in glass tubes. Others are enclosed in fiber cartridges. The visible type is used primarily in automobiles and the others in trucks or buses.

In general, lighting and accessory circuits are fused. Therefore, when either the lights or accessories fail to function there is a possibility that a new fuse is required. When a fuse blows it is only common sense to investigate before replacing it, for the mere fact that this has occurred shows that something is wrong. Whatever it is, the trouble should be corrected before the new fuse is installed.

In addition to preparing for trouble by carrying a spare fuse or two, the car owner can help forestall it by a periodic check of all the wiring to see that contacts are secure and that corrosion has not occurred. At the same time, check over the wiring, with particular attention to places where the insulation may be abraded.

If a short circuit puts a vibrating circuit breaker into action, its audible clicking warns of trouble.




In buses and trucks, thermostatic relays or circuit breakers (also called current-limit relays) sometimes perform the work of fuses. When there is excessive current, the bimetal blade of a thermostatic relay warps, opening the circuit. When it cools, the circuit closes. This repeats until the condition that causes it is corrected.

Two types of circuit breakers are used, vibrating and lockout. Both are of similar construction. When a heavy flow of current occurs, the iron core of the circuit breaker is magnetized, causing it to attract the iron armature and separate the contact points.

In the vibrating type, this cuts off all current momentarily, the points return to contact, and the process is repeated, causing a warning clicking sound. In the lockout type, there is an additional high-resistance winding around the iron core, the ends being connected across the contacts. Hence, when a heavy flow of current magnetizes the core and the armature is drawn against it, the magnetic field of the fine wire keeps the armature in place and the contact points separated. A small amount of current continues to flow through part of the shorted circuit, but serious damage is prevented.

Both types of circuit breaker are sometimes used on the same car, the vibrator being connected in the lighting circuit and the other in the circuits to the accessories.



Copyrighted material

# Stan and a Schoolmarm

By MARTIN BUNN

STAN HICKS, the Model Garage grease monkey, stopped whistling as he completed the minor job he was doing, and with a note of preoccupation said: "It's funny."

Gus Wilson looked up from another job. "What's funny?" he asked.

"I was just thinking," Stan explained.

"That *is* funny—and dangerous, too," Gus cautioned. "It's a habit that could grow. But I guess you needn't worry."

Stan grinned at his employer. "I was just thinking," he went on, "how different things are now from a year ago. Then pretty near every customer wanted us to do something to make his bus last forever. Now pretty near everyone wants us to do something to make it go faster."

"Well, why not?" Gus said. "A year ago the speed limit was thirty-five miles, and almost everyone was patriotic enough not to exceed it. Now we've got prewar speed limits back, and even if most tires aren't all they should be, most people want to travel at the legal limit. That's only natural after all."

"Maybe so, boss," Stan conceded, "but what *is* funny is who some of the people are." He pointed at a 1940 sedan near the shop door. "That job was brought in while you were out to lunch. Know whose it is?"

Gus glanced at the car. "Of course—it belongs to Miss Flagstone, the school teacher," he said. "What's the matter with it?"

"She's coming in after school to tell you all her girlish troubles," Stan said, grinning. "But her big gripe is that it don't behave nice when she gets it up over fifty." He looked at Gus with a what-now expression on his callow face. "Imagine, boss—an old white-haired lady like her!"

Gus jumped as if a wasp had tagged him. "What d'ya mean, old lady!" he yelped. "Why, Miss Flagstone's younger than I am—and she's got ten times more get-up-and-git in her than any of you young false-alarm fireballs!"

Stan's grin widened. "I didn't mean anything personal. Anyhow, you're different—sort of," he said tolerantly. "Why, Miss Flagstone was my teacher in the eighth grade, and even then she had gray hair and we called her Old Lady Flagstone!"

"That proves she had fresh kids in her class," Gus growled. "Get the hose and a broom, and harness that flaming youth of yours to the job of cleaning up the driveway."

Stan, the sweat of honest if unwilling toil streaking the grime on his face, was busy in the driveway when Miss Flagstone got out of a taxi. He pretended not to see her, but she wouldn't have it that way.

"Why, Stanley," she exclaimed, "I thought you told me you were a *mechanic*."

Stan's face got redder. "S-so I am, ma'am," he stuttered. "But even a m-mechanic has to do jobs like this once in a while. You can't expect—"

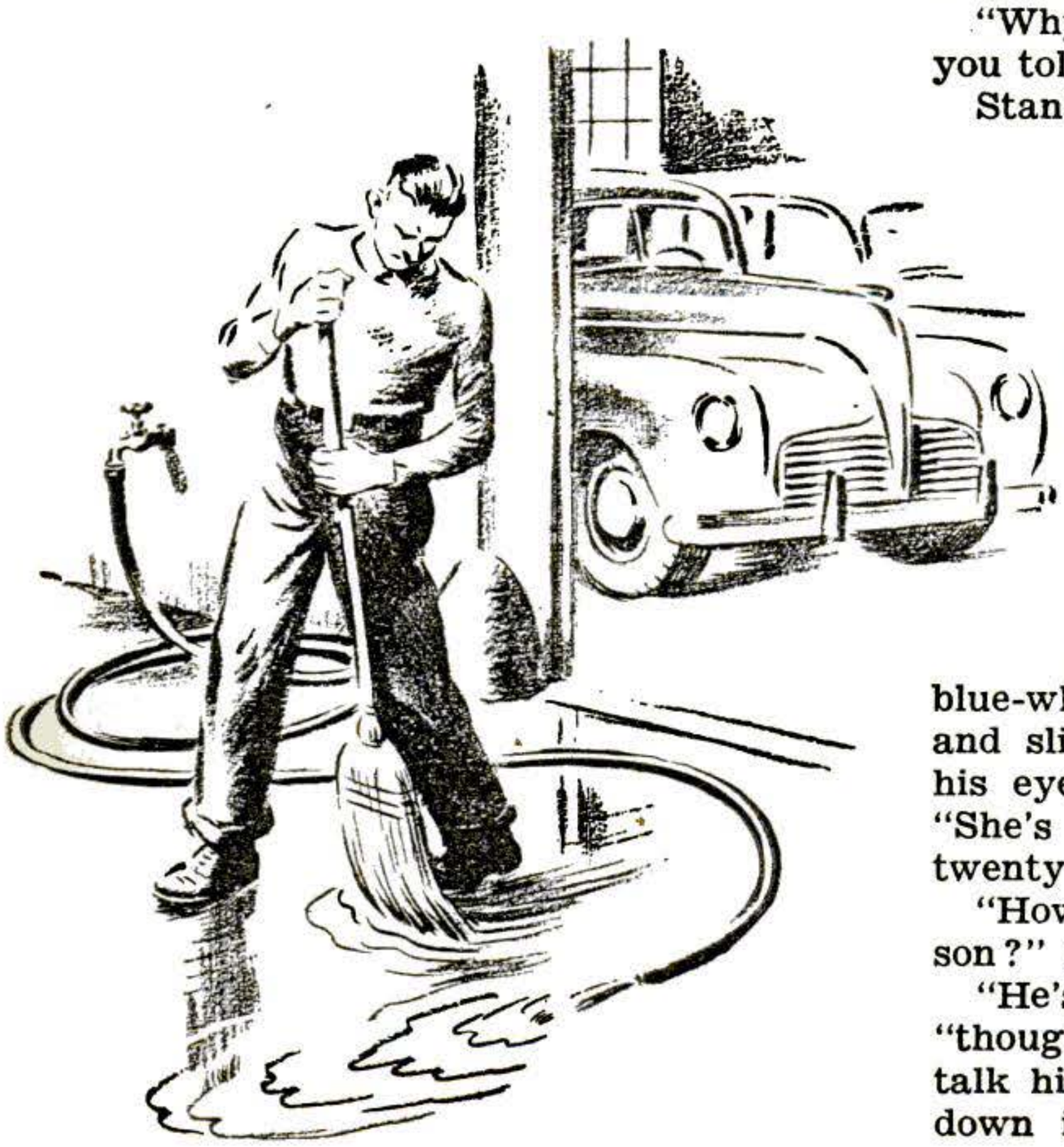
"Of course, you can't," Miss Flagstone agreed sweetly. "Is Mr. Wilson in?"

"Yes'm," Stan told her with politeness in his voice and murder in his heart. "He's in the shop."

Miss Flagstone went in. Gus, who has known her for a flock of years, regarded her with freshened interest and didn't find her crisply waved blue-white hair, fresh-complexioned face, and slim tweed-clad figure at all hard on his eyes. "Old lady!" he said to himself. "She's better looking now than she was twenty years ago!"

"How's my friend Stanley doing, Mr. Wilson?" she inquired.

"He's doing all right," Gus told her, "though he'd do it a lot faster if I could talk him into taking an automotive course down in the city three evenings a week.





Copyrighted material

# Teach Gus a New Trick

But he says that when he gets through his day's work here he's too tired to drive to the city. Except for that, he's doing fine. He's going to develop into a real mechanic some day."

"Stanley was one of my pet pupils," Miss Flagstone said, "but I soon found that he needed sitting on every so often. He still does—and I've just sat on him again."

"Good for you!" Gus applauded. "So have I. That dumb-and-dirty job he's doing outside is a form of sitting on that I save up for times when he shows signs of getting too big for his boots. . . . Well, what's the trouble with your car, Miss Flagstone?"

"*You'll* have to tell *me* that," she said. "My guess is that during the war it got out of the habit of running over thirty-five and can't readjust itself. Whenever I try to drive over fifty the motor misses and sputters, and sometimes the car bucks hard."

"Have any trouble starting?" Gus asked.

"Yes," she admitted. "The same thing happens in both low and second when I try to make a fast getaway when a light goes green. It doesn't make much difference driving to and from school, but beginning tomorrow I'm doing what you want Stanley to do—taking a—well, a course down in the city. I have to be there by six o'clock two days a week, and as I seldom get away from school much before five I'll have to step on it."

"So that's it," Gus said. "When I tell Stan you're

Copyrighted material

taking a course, it may shame him into doing the same. If you can do without your car until tomorrow afternoon, I'll have it at the school before five."

GUS had the best intentions, but rush job after rush job came in, and about four the next afternoon he woke up to the fact that he'd done nothing on the car.

"Hey, Stan!" he called. "Help me check this Flagstone bus. We've got to get it out in a hurry. Let's see, now—engine misses at high speeds and on quick starts in first and second gear. It could be the coil."

He connected an ammeter in series with the battery and the primary terminals of the coil. The indicator hand moved to the 5-amp. mark, and when the coil had warmed it moved back to 3 amp. and stayed there.

"No ground or open circuit in the primary winding," Gus said. Then with the engine running he held one spark-plug cable near the motor block. A fat, hot spark jumped the gap.

"Nothing the matter with the coil," he decided. "And the condenser seems O.K."

"How about spark plugs?" Stan asked.

"You check 'em." Gus told him. "I'll take a look at the wiring and connections."

The plugs gave good sparks, and the wiring and connections were in A-1 condition.

Gus looked at the shop clock. "Maybe the grief is in the distributor, or maybe it's in the high-speed jet of the carburetor, or it might even be in the fuel pump," he said. "Wherever it is, I'm not going to be able to find and fix it in half an hour."

"Wait, boss," Stan cut in. "I got to thinking about that old gal taking an evening course, and I figured if she can stand it so can I. Tonight's the deadline for signing up for the next term, and I'm going down to the city to register. I could take her with me and pick her up after her class."

GUS went down to the Park House and ate his dinner, and then went back to his shop and retackled the troublesome Flagstone job.

"A worn distributor shaft could be causing the trouble," he reasoned. "If it left the distributor shaft free enough for it to wobble, the cam wouldn't touch the points when the shaft was on the out-wobble."

He disassembled the distributor, but all its parts seemed to be in perfect condition. Next, he checked the carburetor and the fuel pump without result. Nine o'clock found him badly puzzled.

Just then Stan came in. "You're back early," Gus grunted.

"It didn't take long," Stan said. "Miss Flagstone will be in for her car in a few minutes. Got it fixed?"

"No, I haven't," Gus growled. "It's got me pretty well stumped." He scowled at the sedan as he filled and lighted his pipe. After a few puffs his face brightened. "By gum," he muttered. "I'll bet that's it."

He went over to the cabinet in which he keeps his instruments and came back with a spring-type scale. With it he tested the distributor-point springs.

"Ten to twelve ounces," he said, "and they should show at least fifteen."

"What's all this?" Stan demanded.

"Something for you to remember—and I should have remembered sooner," Gus told him. "Weak point springs—one of the very toughest troubles to diagnose. The point springs in this distributor have lost their strength and snap. They don't close as fast as they should, so the coil is robbed of its normal build-up period, and there isn't enough spark to fire the engine."

Stan thought that over. "I get it," he said. "But what I don't get is why the engine misses only at high speeds."

"That's easy," Gus explained. "At low speeds even weak springs have enough snap to close the points promptly on the slower-revolving distributor cam. We'll put in new springs, but we'll test them first. Sometimes new springs haven't strength enough."

Gus installed good new springs—and the engine ran smoothly at all speeds.

"Say, boss," Stan asked, "what course do you think that old gal is taking?"

"Something high-brow," Gus replied.

Stan grinned. "She's taking dancing!"

"What?" Gus asked. "Well, she's got a right to take dancing if she wants to. But she doesn't need lessons. I know—I danced with her at the Town Club's ball."

"Yeah," Stan retorted, "I saw you. You were good, too—in a slow sort of way."

Gus reddened. "I can waltz and fox-trot well enough. But no fool jitterbugging."

"You're missing something!" Stan told him. "Now, you take the samba—"

"You take it—and welcome," Gus said.

"Now, lookit," Stan insisted, demonstrating. "Left foot forward—right foot farther forward—left foot sideways—right foot over beside it—left foot—"

Gus did the step. "Nothing to that."

"Oh, Stanley's showing you all *wrong!*" Miss Flagstone's voice said from the shop door. "Watch! It's *this* way! But you need music. Switch on my car radio."

TWENTY minutes later the door opened again, and Joe Clark came in. "I saw the lights," he said. "I didn't expect *this!*"

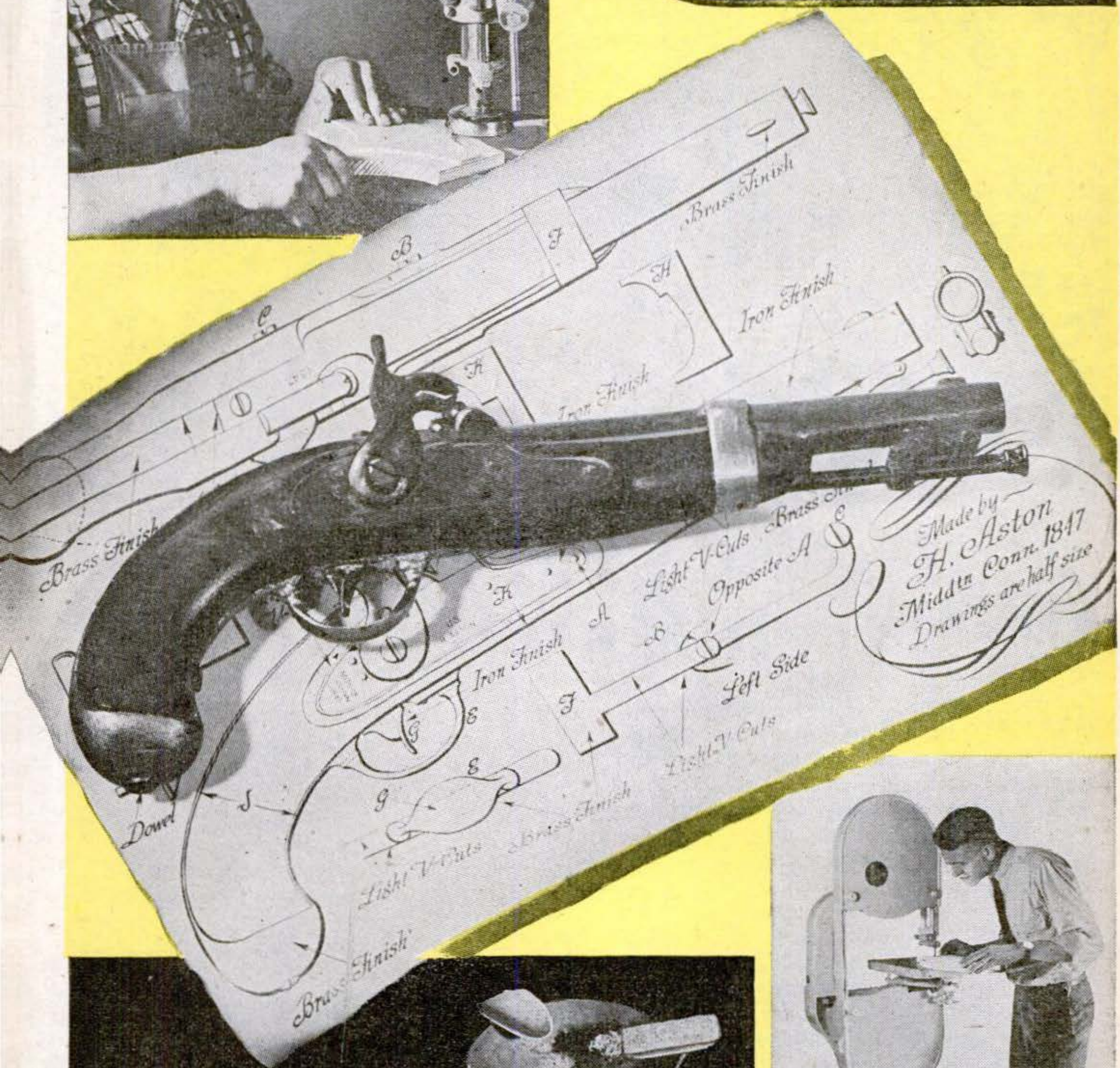
His face split into a wide grin, and as Gus and Miss Flagstone whirled past him he tapped his partner's shoulder.

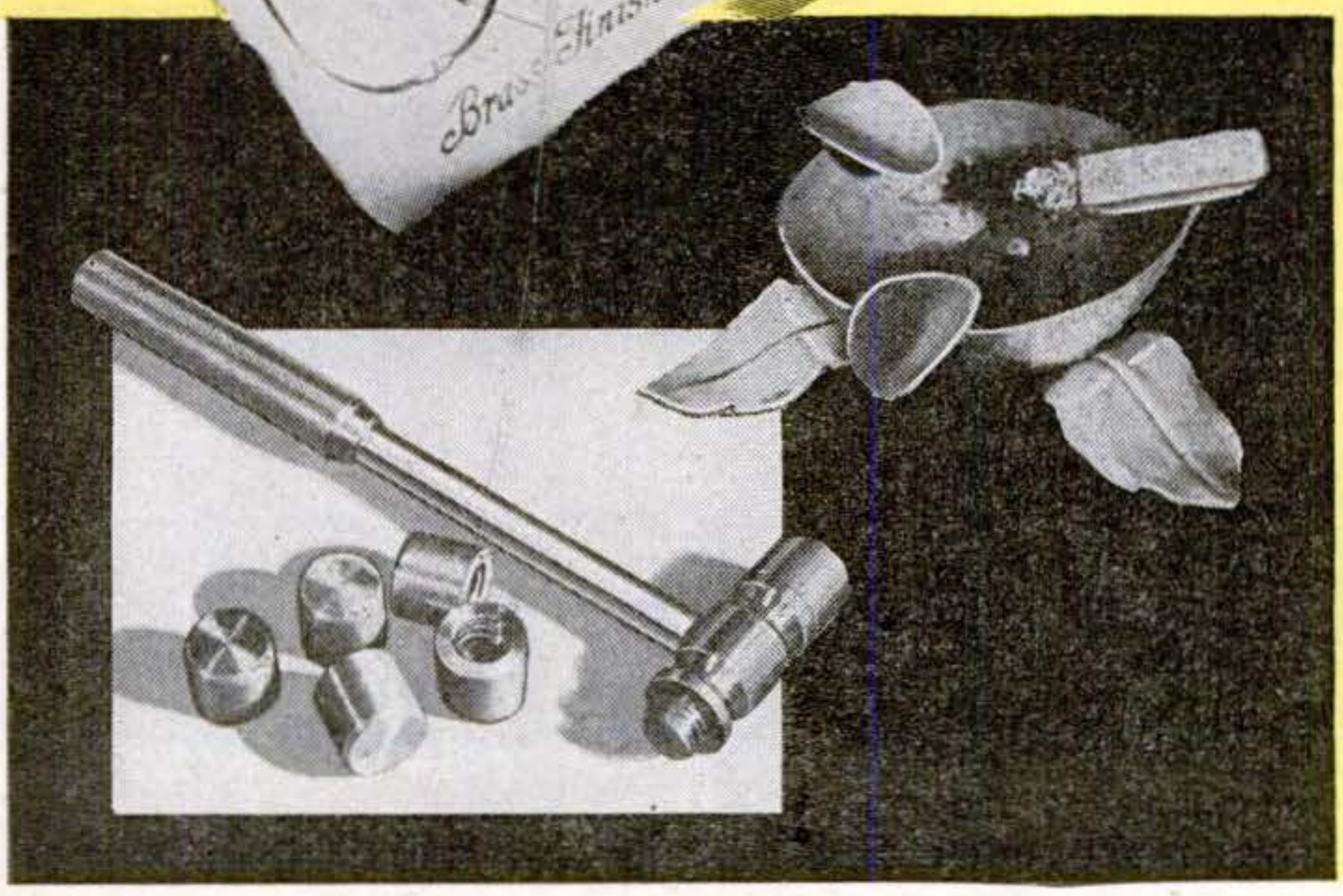
"Excuse me," he said. "I'm cutting in."



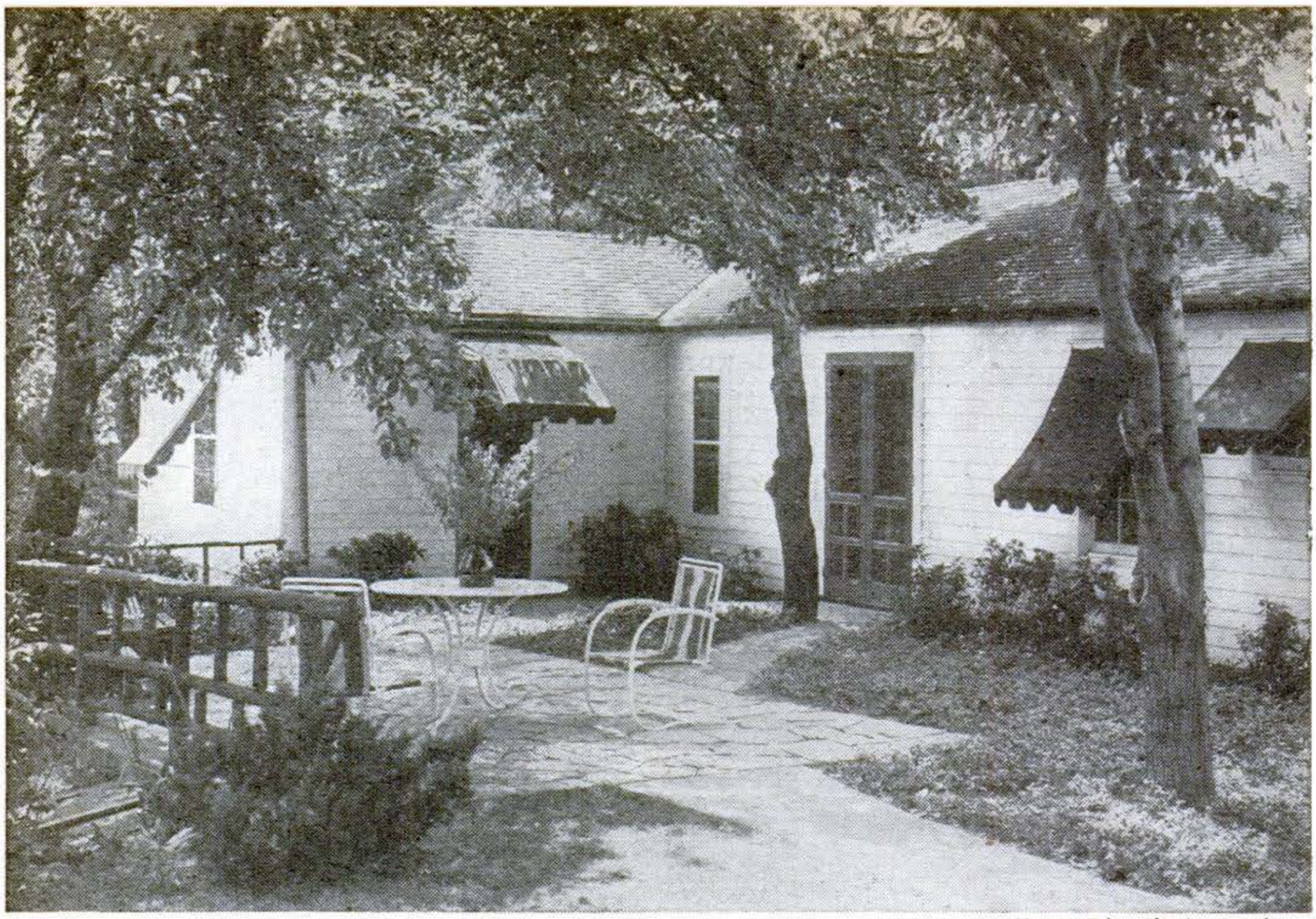
Copyrighted material

# MECHANICS AND HANDICRAFTS



Copyrighted material



*Mattie Edwards Hewitr photo.*

**Terraces are effective on small as well as large lots. This one was built up at the edge of the plot.**

# An Extra Room *Outside*

MANY a new home is being planned with an adjacent terrace at front, on one side, or in the rear. Architects and home buyers alike see it as an additional room—roofless for outdoor living—and the terrace is often designed to fit the architecture and to match or blend with the house proper. Older homes do not always have such an "outside room," but given a level spot near the house, or a spot that can be leveled, the omission is easy to correct.

If the terrace site has sun, air, and a certain amount of shade and moisture, its surfacing may consist of a good plot of tough grass, possibly obtained by fertilization, mulching, and extra seeding and care of your present lawn. Grass has some disadvantages, though, especially since it cannot be used for some hours after a rain. It may also stain clothing; and dogs and children will dig in it.

The next simplest surface is gravel or bluestone of the kind used for suburban driveways. It requires no care beyond once-a-week raking over and occasional renewal, is simple and inexpensive, is readily obtained, and has a pleasant appearance. When maintained at a depth of 1½", it will keep down grass and other growth. But furniture cannot be dragged across it without making deep marks that need to be smoothed out, and it cannot be used freely by children, since a fall in a running game is sure to bring badly cut knees and hands.

Bricks make a good terrace and need not be expensive if a quantity of old bricks is available. Set the old bricks in to alternate with new ones. Bricks may be laid close together as in a wall or with open space between for grass, and the patterns are limitless. When there is planting between bricks, it is well to have a solid brick edge and a central solid spot. The grass-and-

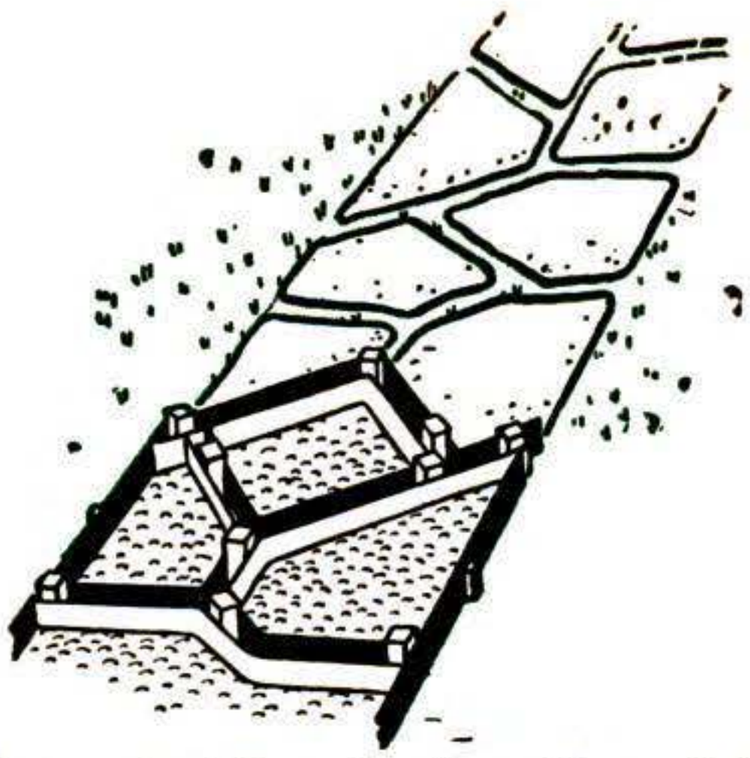
## CONCRETE-FLAGSTONE MIX

**For a base course, use a 1-2-4 mixture with coarse, clean gravel as aggregate; for surfacing, 1 part cement and 2 parts fine sand.**

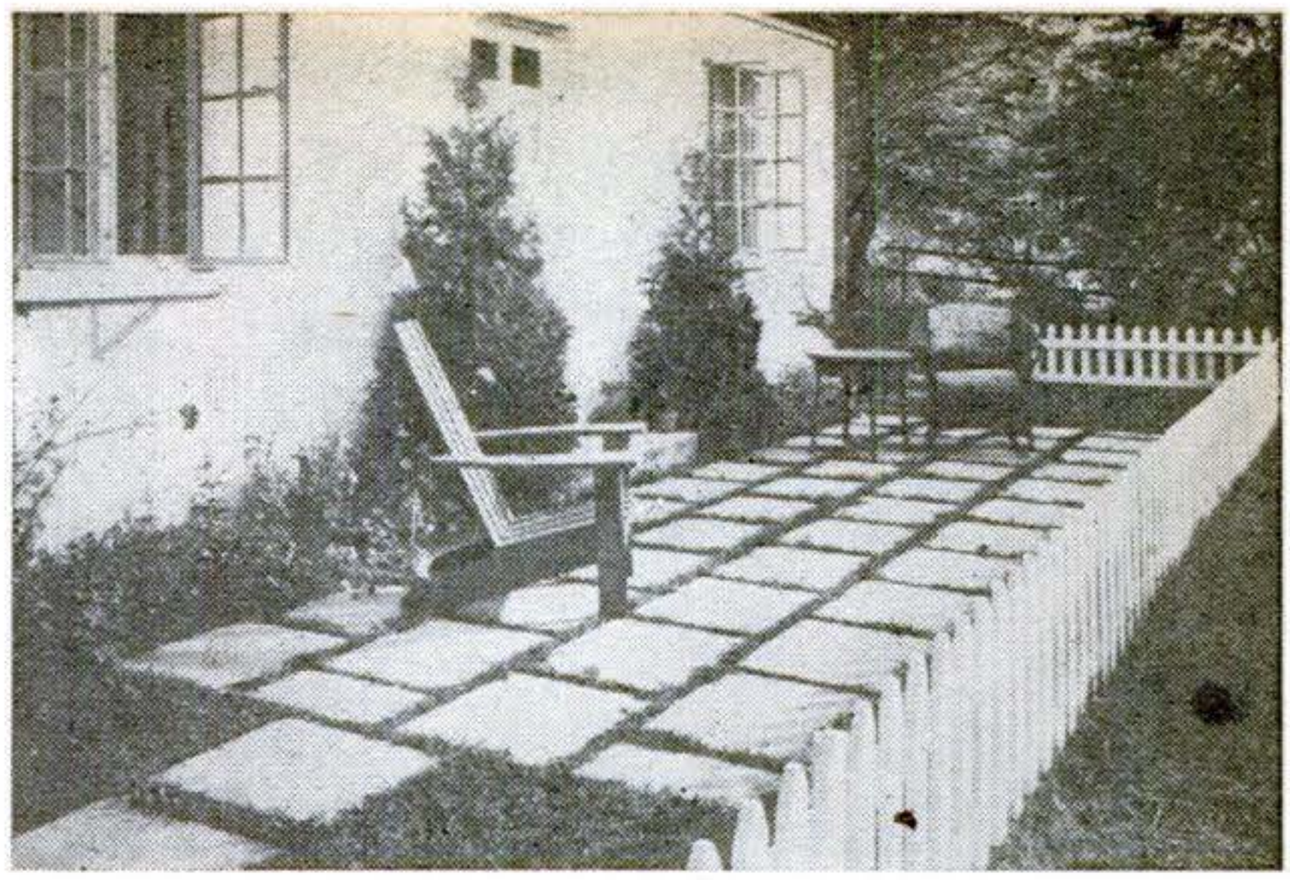
**The surfacing coat may be colored with special cement colors or ordinary dry Venetian red, burnt umber, yellow ocher, or other powder mixed in dry before the water is added.**



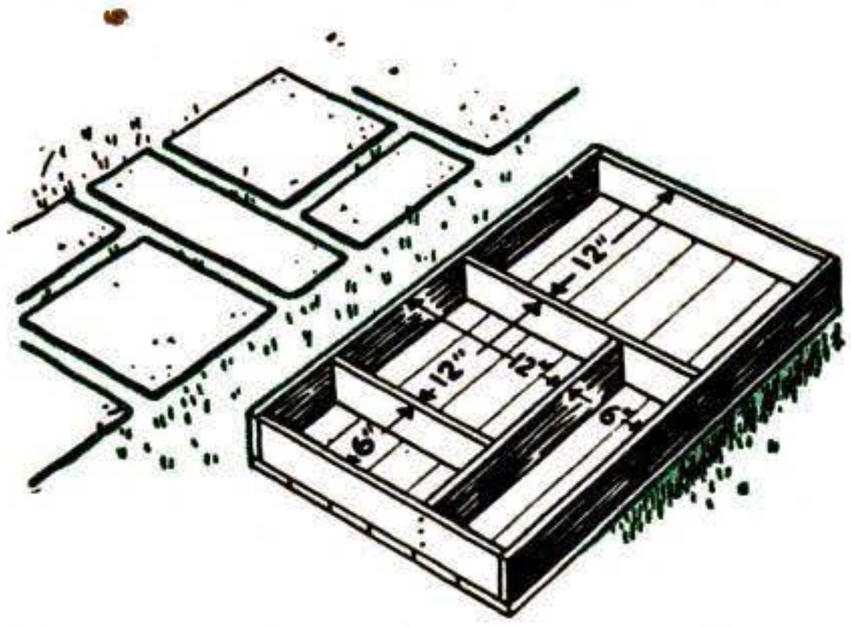
Copyrighted material



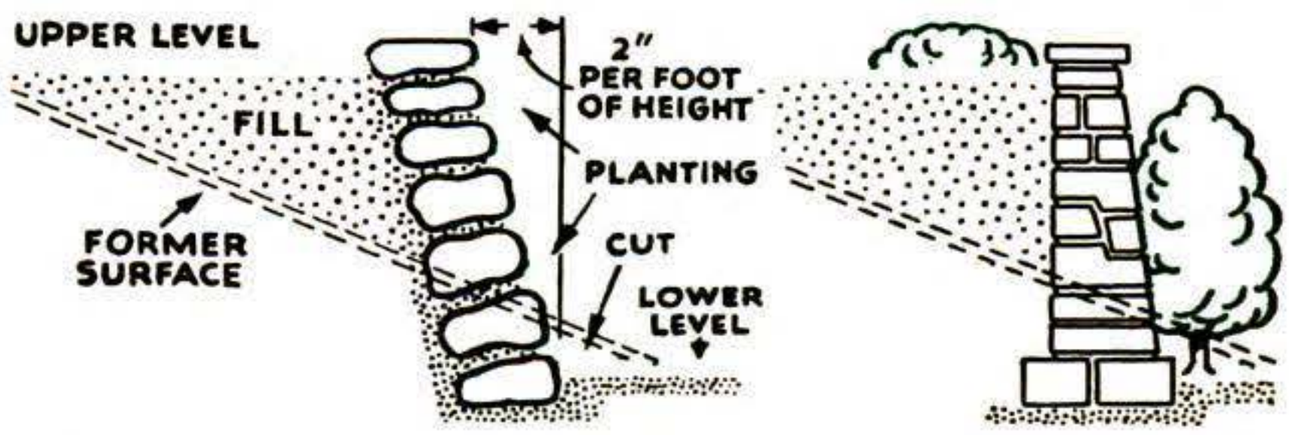
As a set of flags hardens, the metal strips are moved to make new forms.



This narrow side yard lends itself to simple terracing with a flagstone flooring. The house itself furnishes needed shade.




Wood forms should be well oiled. The flags are made and then set in place.




Level ground for the terrace can be built up from a slope with a retaining wall of field stones (left) or cut stones (right).

# the House

By MORRIS A. HALL

brick arrangement may then be utilized in the intervening spaces.

Tiles can be easily obtained in many colors and are as readily laid as bricks. The most permanent results are had by bedding them close together in a ½" to ¾" layer of cement. Work from the house outward and, with a hammer and pressure of the hands, tap each new tile level and in toward those already laid. A pleasing effect is possible when colored cement is used and the tiles are embedded deeply so the cement will come up between them as a series of colored lines. Red tiles are harmonious with a red-brick house or contrast well with white stucco. Other colors may be chosen, or several colors may be used in a helter-skelter pattern. Neither the pattern nor the colors should be too aggressive, however, for a terrace is intended to be a restful place.

In random shapes and sizes, or cut to exact size, 1" thick slate can be obtained at a building-supply firm by the square yard. It can be as effective in a small terrace as it is in a walk. If the home has a slate roof, or if the general effect is soft grays, mild reds, or a combination of the two, slate is most suitable. The handyman lays the pieces in dirt, grass, cement, or 1" or so of sand. Colors available are gray, dull red,

## PLANTING BETWEEN FLAGS

Arenaria verna, resembles moss, for narrow spaces.
Mazus reptans, tiny creeper from New Zealand.
Moss, in any of the hundreds of types.
Thyme, veronica, and linaria varieties.

If grass is used, take care to eliminate tall-growing varieties such as timothy and redtop and the weak, pale types like Italian rye.

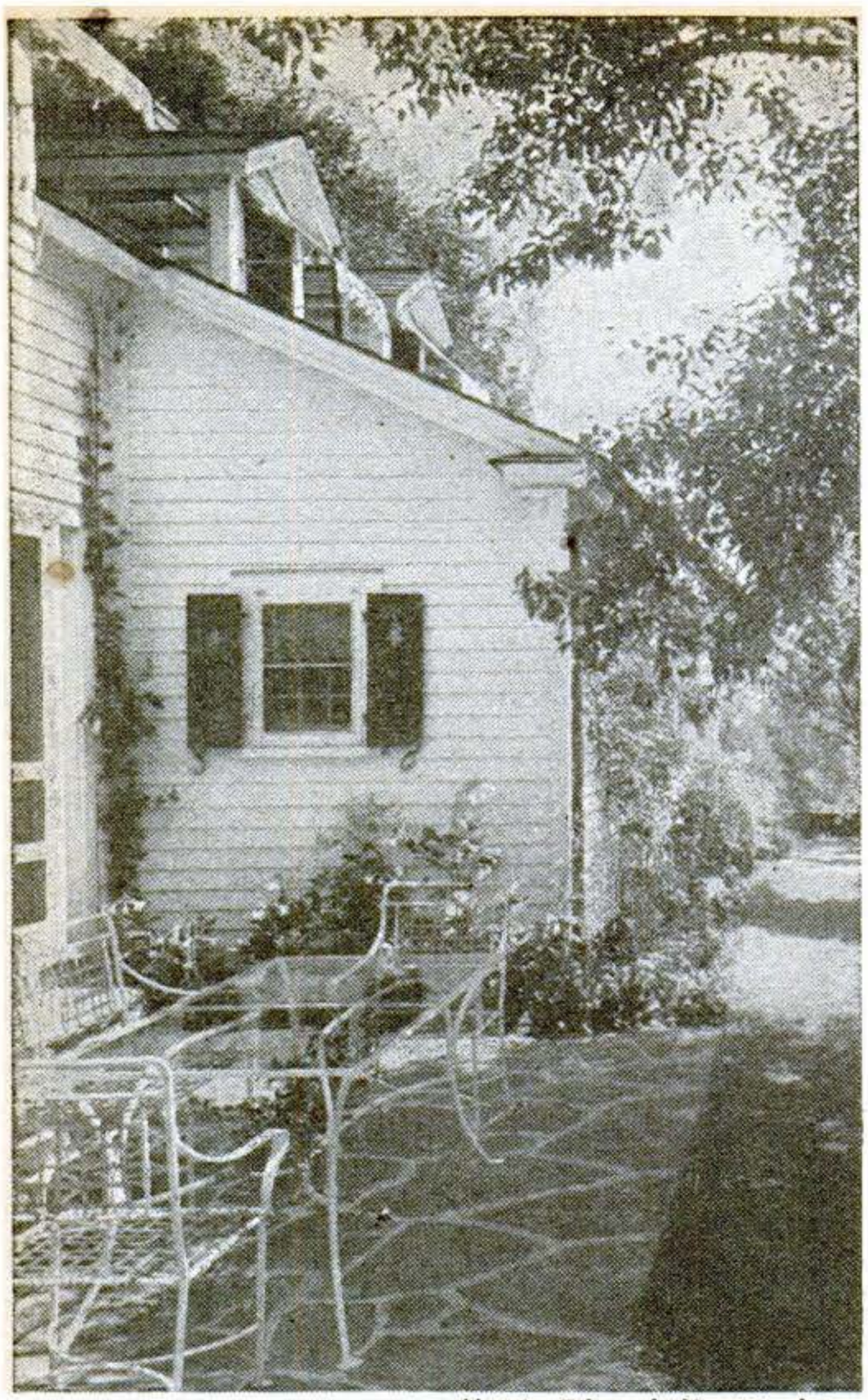
## WALL-POCKET PLANTS

Tunica saxifraga.
Nepeta mussini.
Cerastium tomentosum.
Phlox, dwarfs.
Santolina incana.
Teucrium chamaedrys.
Lavandula vera.
Iberis sempervirens.
Daphne cneorum.
Rosemary and other shrubs.

Fill spaces between stones with topsoil.

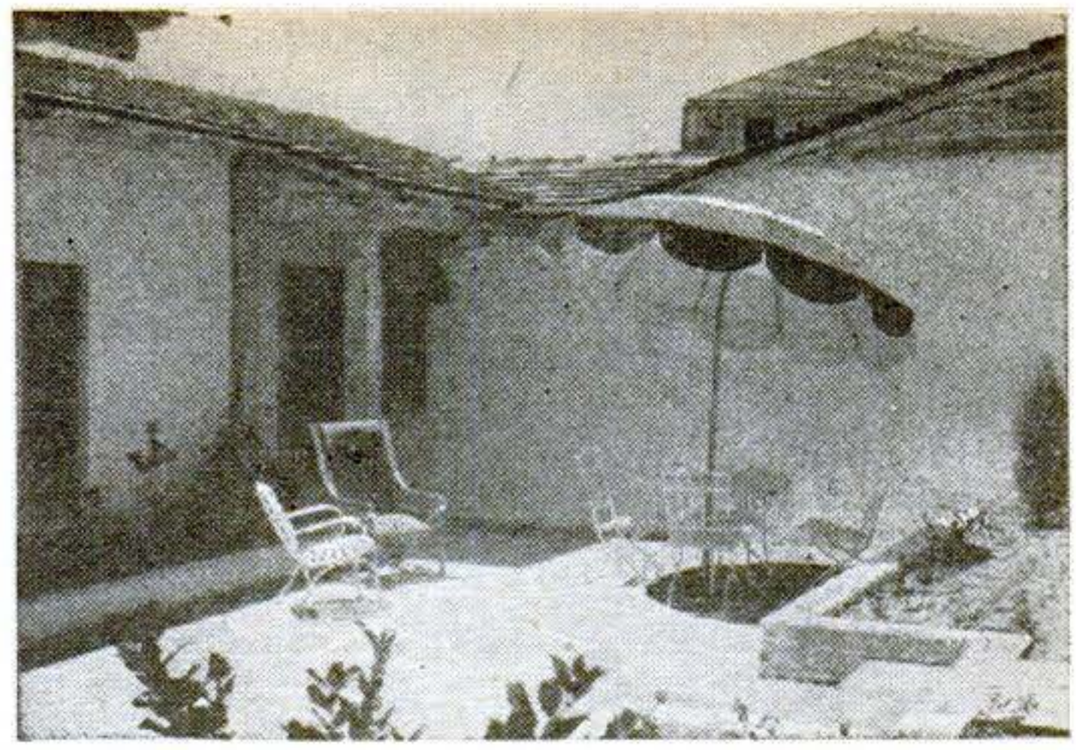


Copyrighted material



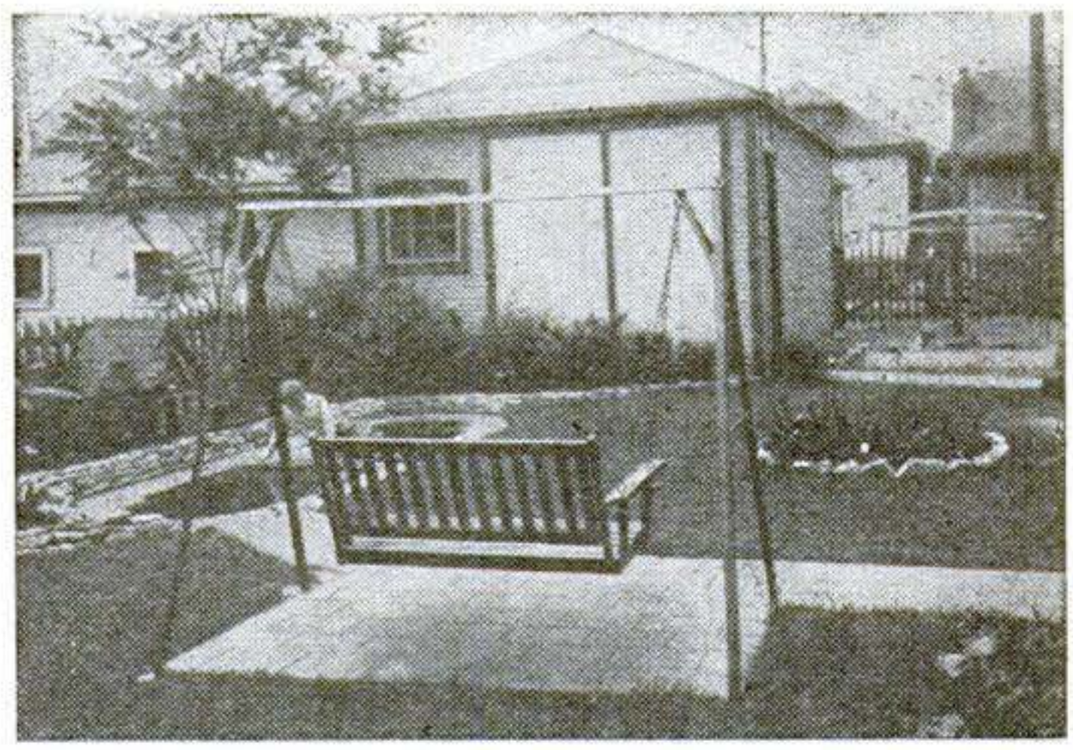
*Mattie Edwards Hewitt photo.*

**Shade from a sprawling apple tree cools a terrace of flagstones that fills an angle in this house.**



**Cemented flags blend with the stucco house here. A low wall separates lounging space and garden.**

**Even a small city lot can be dressed up. Below, a wading pool, sandbox, and terrace for a swing.**



green, an occasional bright red, and modifications. Slate is easy material to handle, especially in large sizes. It can be bedded down in irregular patterns with 2″ of grass between pieces, or the stones can be matched and dirt put between them.

Large, flat field stones are a similar material. They can be collected in some vicinities or bought from a mason's supply company. Most stones are 2″ to 3″ thick, and they come in sizes up to that requiring two men to handle. Collected stones may be somewhat rough, but bought flagstones are usually sawed fairly smooth on both faces.

Much less work than collecting stones, and cheaper than buying them, is molding flagstones of concrete. These may be poured right on the site or made up in separate flags that can be handled just as are field stones or slate. Two forms for such slabs are shown in the drawings on page 147. One is of wood and makes flags in four convenient sizes with straight, even sides for arrangement in a variety of patterns. The other consists simply of several strips of light-gauge sheet metal that can be bent around stakes in random shapes.

Concrete flagstones require a fairly coarse base 2½″ to 3½″ thick on which is poured a smoother cement-and-sand surface coat ½″ or so thick. This surface coat can be crowned so that water will not collect, and it can be colored with special cement pigments or other color powders. Room is left between the flags for grass.

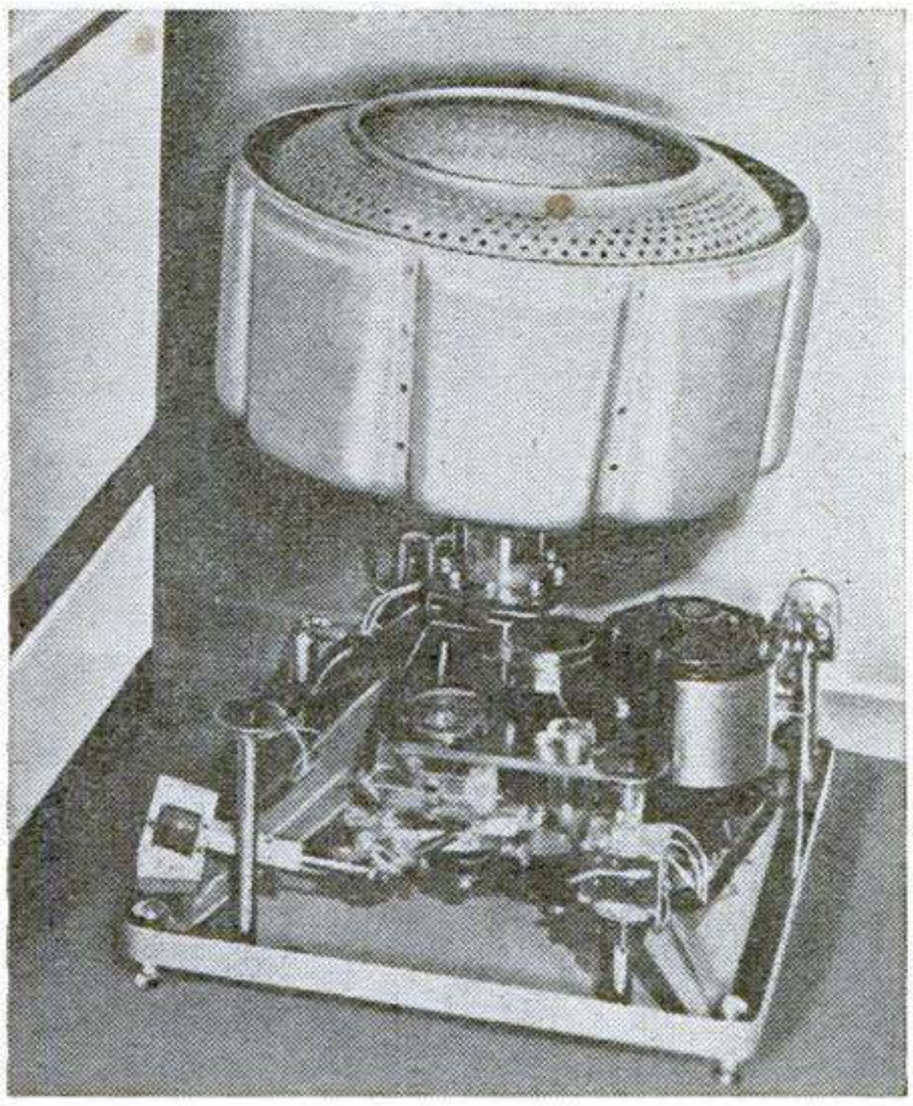
In the case of a house on a steeply sloping lot, it is still possible to construct a terrace, but some sort of retaining wall will be needed to hold back the fill. Two are shown on page 147, one of rough field stones and the other of neatly arranged cut stones. A fieldstone wall provides additional space for growing plants if wide pockets of dirt are left between the stones. If the top of the retaining wall is much more than 3′ or 4′ above the lower ground level, it is well to continue it a little higher than the terrace to serve as a low fence.

For privacy and quiet, a terrace is most desirable in the rear of a house, but front and side terraces can often be secluded by shade trees and shrubs. Southern and eastern exposures are frequently the coolest on late summer afternoons.



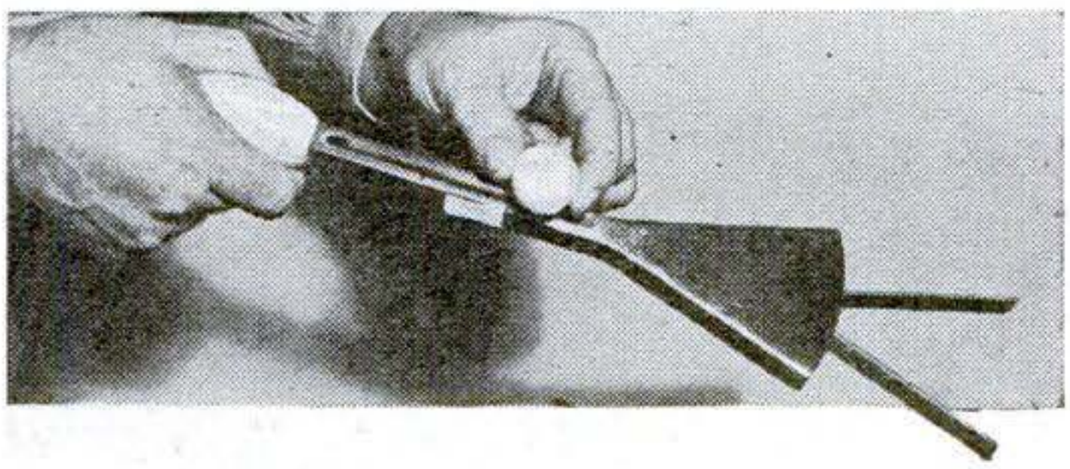
Copyrighted material

# modern living



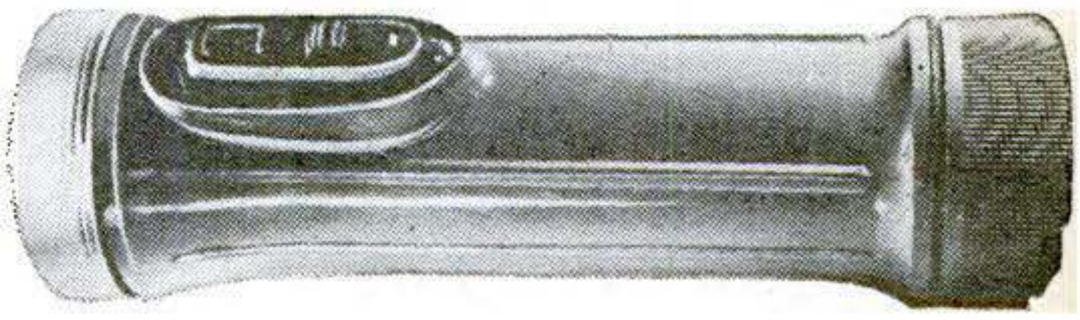
**BOUNCING THE WASH** instead of spinning it is the action of the new Apex automatic washer. The machine, made by the Apex Electrical Manufacturing Company, of Cleveland, takes clothes through a four-cycle process of washing, rinsing, damp drying, and "fluffing." It is in the washing cycle that the basket shown in the photo bounces the clothes as baffles tumble and turn them. The bouncing process is repeated in the fluffing stage. During the rinsing, bouncing and spinning alternate.

The machine rests on feet that are hydraulically linked so that the washer is self-leveling. An automatic switch stops all action when the lid is raised.

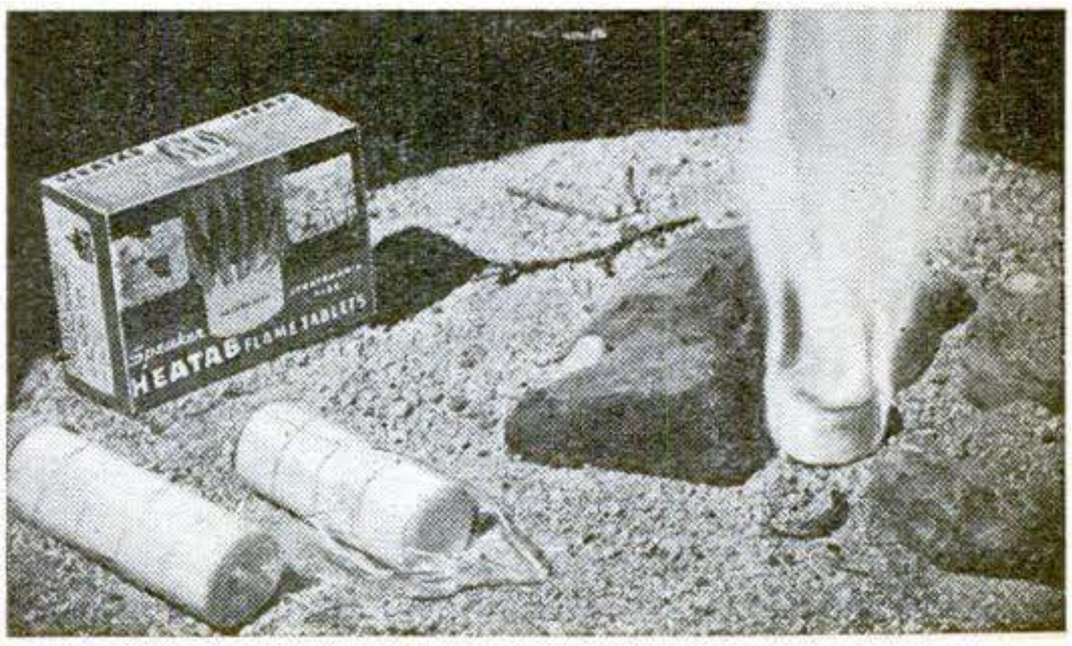


**PIE A LA MODE** may now have its ice-cream wedge shaped to fit the conventional slice of pie, thanks to the Crosby Foundation, of Hollywood. The scooper shown above, an invention sponsored by the foundation, dips up ice cream of the correct size and shape.

**TABLETS OF HEAT** 1½" in diameter by nearly 1" thick and with a burning time up to 35 minutes are now being made by the J. W. Speaker Corporation, of Milwaukee. The tablets have many uses, including starting coal fires and bonfires of damp wood, preheating stoves or torches, boiling liquids, and warming hands.



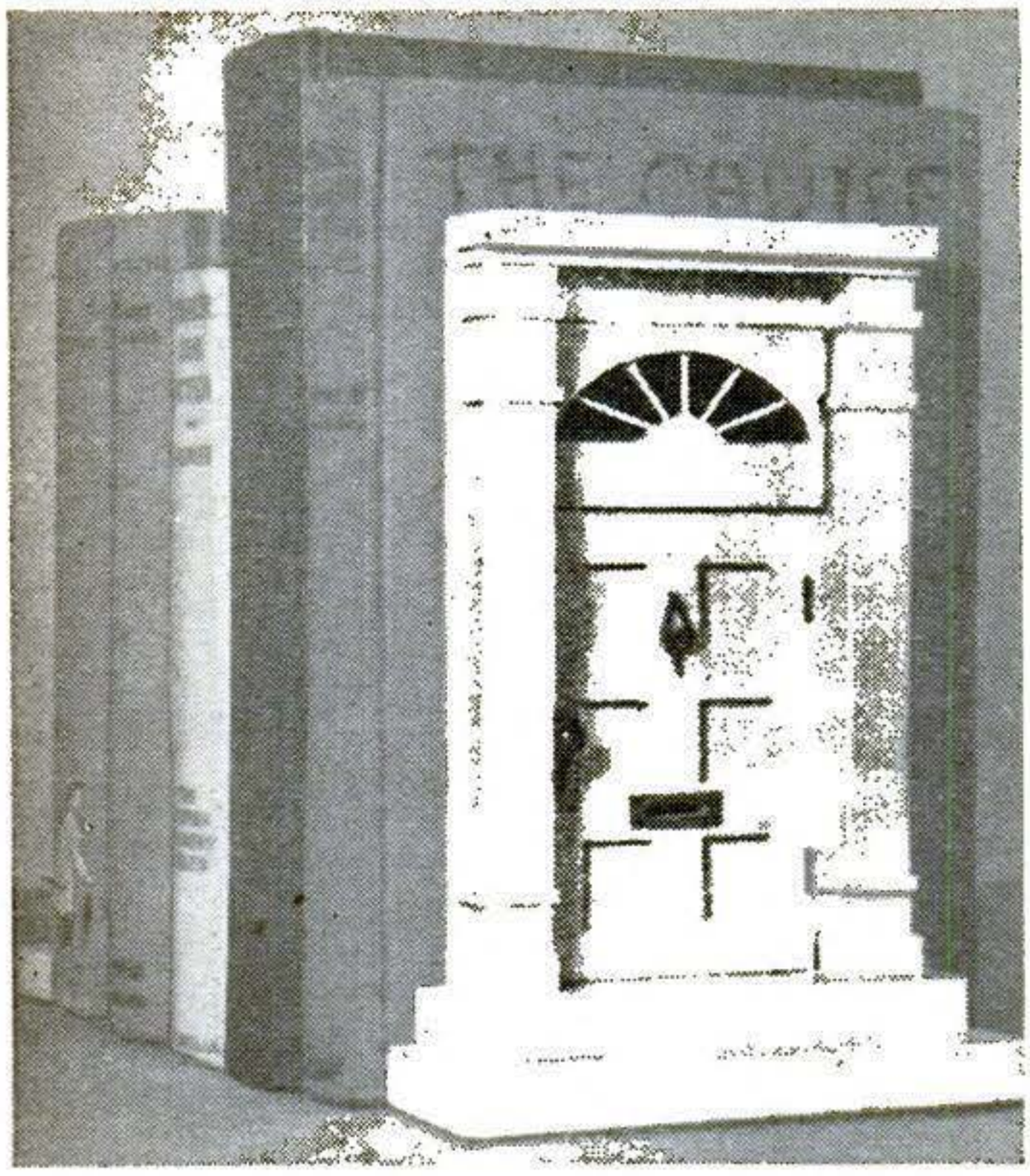
**SEALED AGAINST WATER,** this flashlight operates in rain, fog, and salt air. Body and ends are of plastic with rubber washers fitted between them to keep out moisture. Usona Manufacturing Company, Inc., of Toledo, makes the lamp in a two-cell size with a three-position switch.

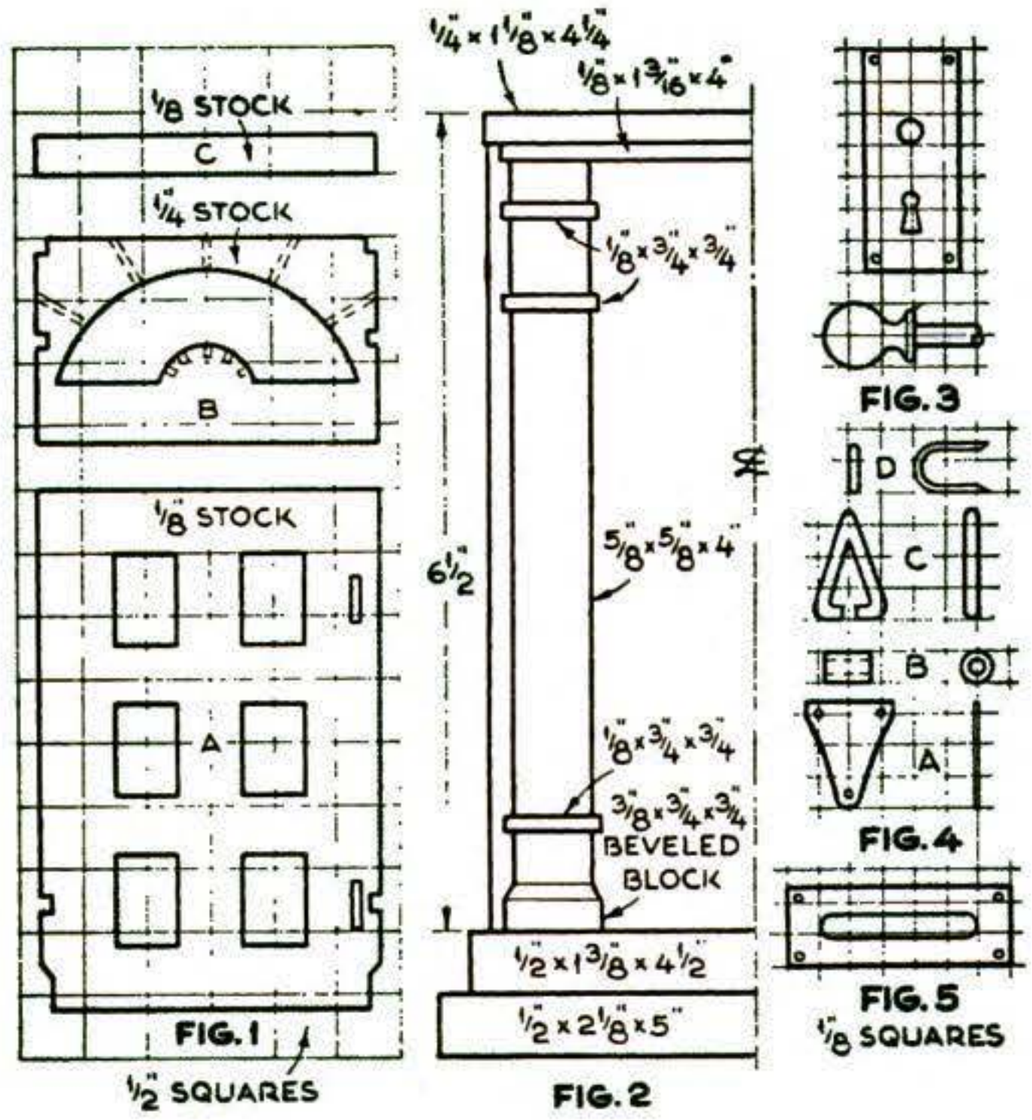





Copyrighted material

# Door-to-Knowledge Book Ends





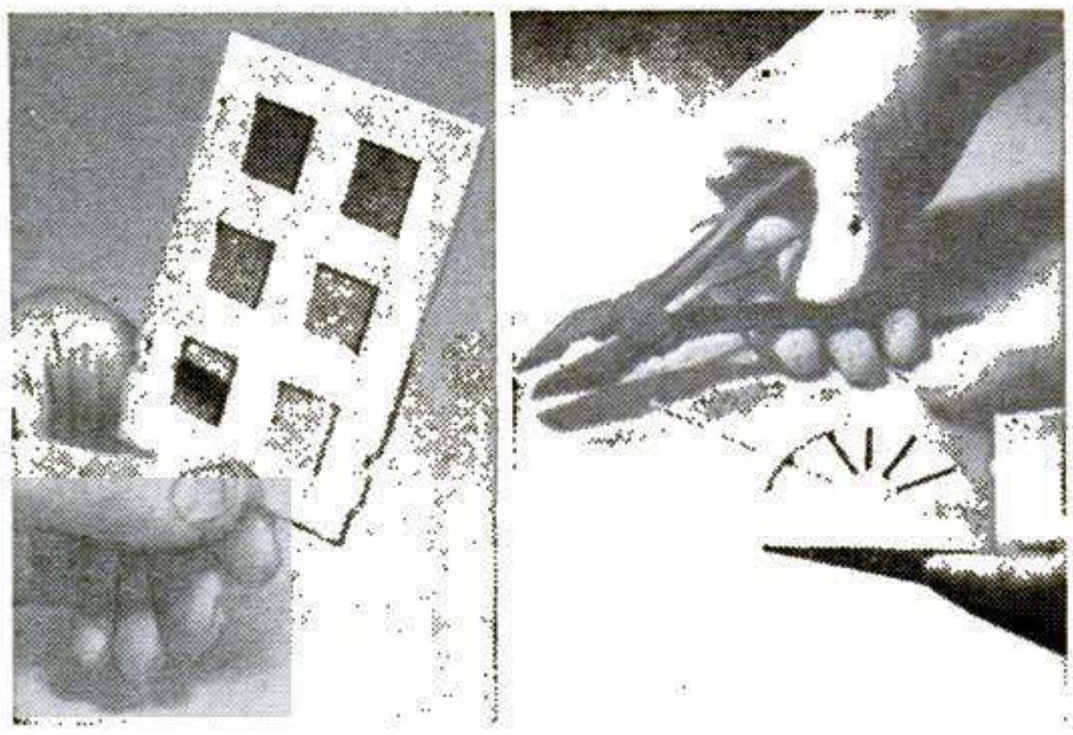

**By CHARLES and BERTRAM BROWNOLD**

THESE unusual book ends can be made entirely with hand tools. The door for each end may be of plywood, cigar-box stock, or other thin wood. It is shaped as shown at *A* in Fig. 1 with six rectangles cut out to give the appearance of paneling when the piece is glued against a backing. Two slots near the edge take bits of scrap metal, inserted after assembly and painting, to represent hinges. Cut the opening in fanlight *B*, drill radially from the edges as indicated by the dotted lines, and force in short lengths of wire. *C* is a filler strip to be glued in above the fanlight.

The steps, pillars, and lintel (Fig. 2) are glued and bradded together and to a 1/8" by 4 1/4" by 6 1/2" backing piece of thin wood or plywood, or glued and clamped without brads, and the other parts, with the exception of the fanlight, are fitted and glued in place. Paint the space behind the fanlight dark and the rest of the assembly light; then paint the fanlight the same light color, glue cellophane on its back, and glue it in place when the paint has dried.

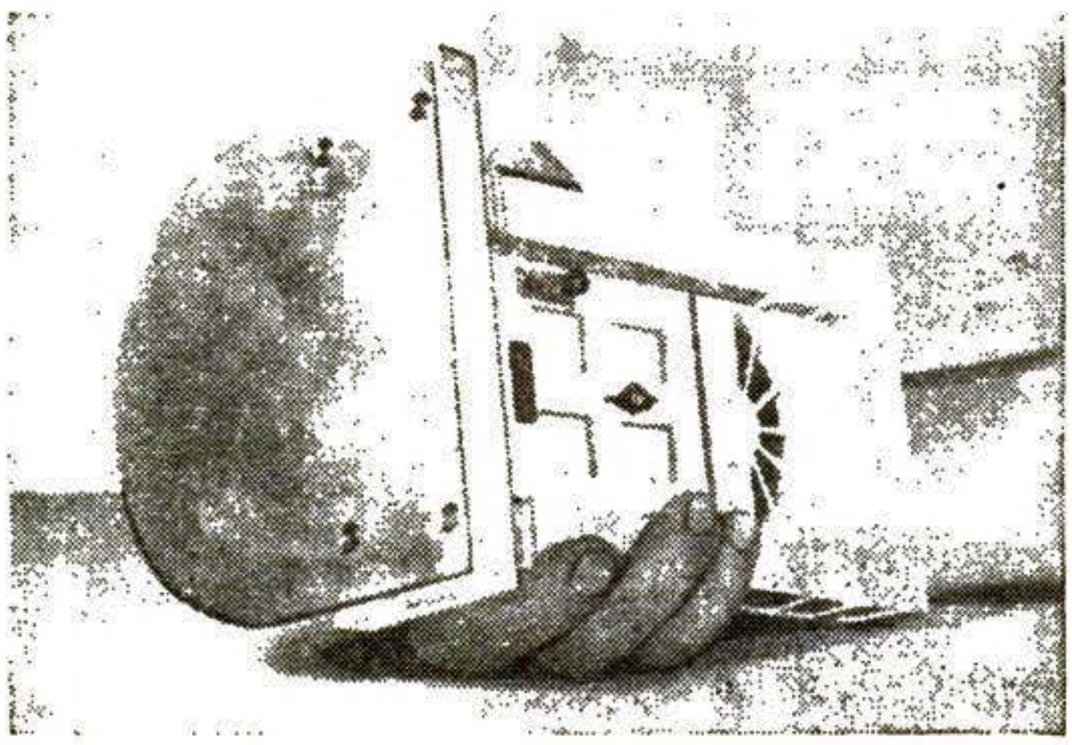
Hardware is cut from thin sheet metal, except for the doorknob (Fig. 3), which may be the pin from a small hinge. The knocker (Fig. 4), consists of the strike *A*, which is held to the door with three escutcheon pins, the hammer parts *B* and *C*, and the holding staple *D*. Figure 5 shows the letter drop.

Thin sheet metal cut 5" by 5" and rounded to a 2 1/2" radius at one end makes a base.



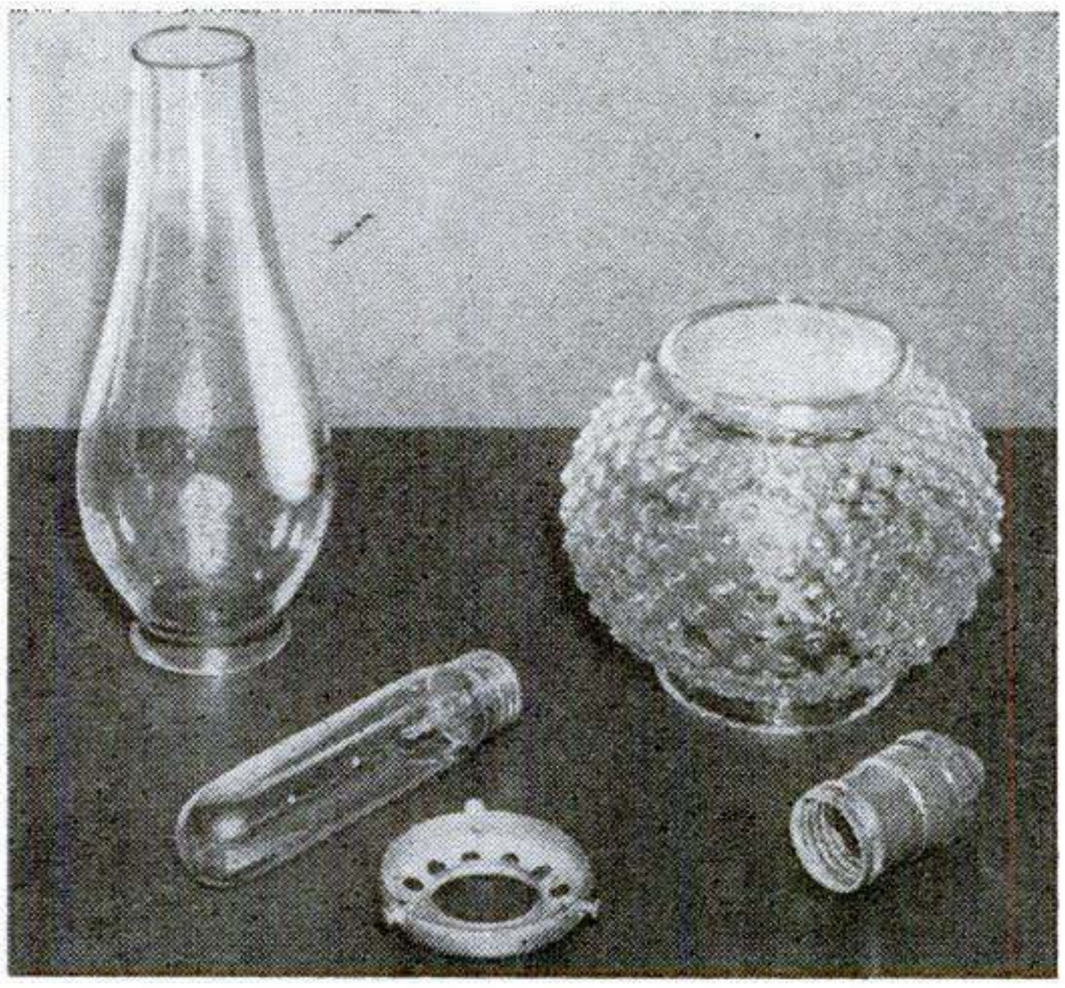
Rectangular holes in the door, as shown at left, provide an effect of paneling when the backing is glued in place. At right, short wires are forced into the fanlight and filed smooth at the edges.

Sheet metal rounded at one end provides a base to slip under the books. Countersink screws in it.





Copyrighted material



Colonial charm marks this little lamp. The socket sets well into the wood turning on top of the hobnail globe to lessen height. A holder for a desk-lamp shade screws onto the socket to support the chimney.

Make turning A a force fit in the collar and slip them over the lip left on the globe when the bottom is cut out.

# A Hobnail Lamp from Common Parts

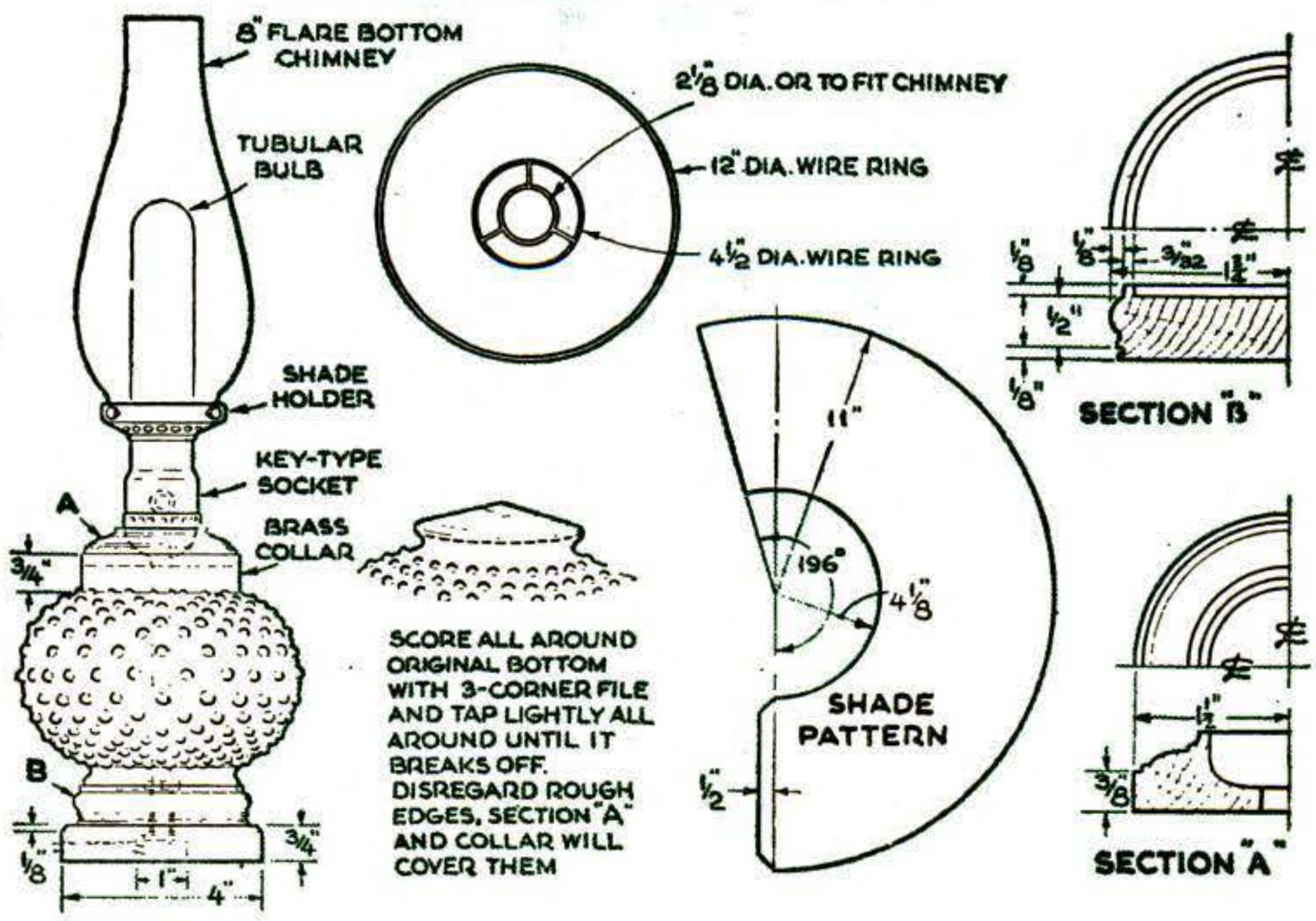
By JOHN J. GALLIVAN

ONE of those old-fashioned hobnail globes used on porch lights forms the base for this Colonial chimney lamp. Fitted with a tubular incandescent bulb, the little lamp will provide a soft welcoming light in a reception hall or brighten up a dark living-room corner.

Hobnail globes can be found at mail-order houses and in some hardware departments carrying electrical equipment. The globe is used inverted with the bottom cut off at the dotted line shown in the drawing so there will be an opening at both ends. A method of cutting the glass is detailed in the drawing. Be sure to leave a lip or flange in cutting the glass so the brass collar can be slipped over it.

Paint inside the globe to harmonize with the room. Ordinary show-card color dries quickly and is extremely opaque. Two coats give a smooth, even finish that is hard to tell from opaque colored glass.

Make the wood turnings *A* and *B*, and then drill *A* for the socket end and *B* for a 5⅝″ length of ⅛″ running-thread pipe which, with two nuts on the lower end, holds the lamp together. The square base is drilled radially and from the bottom, the 1″ diameter hole being stopped at a depth of ½″. Finish the wood parts with good-quality gold bronze and clear lacquer. A metal shade holder supports the chimney. The shade may be bought or made as shown.





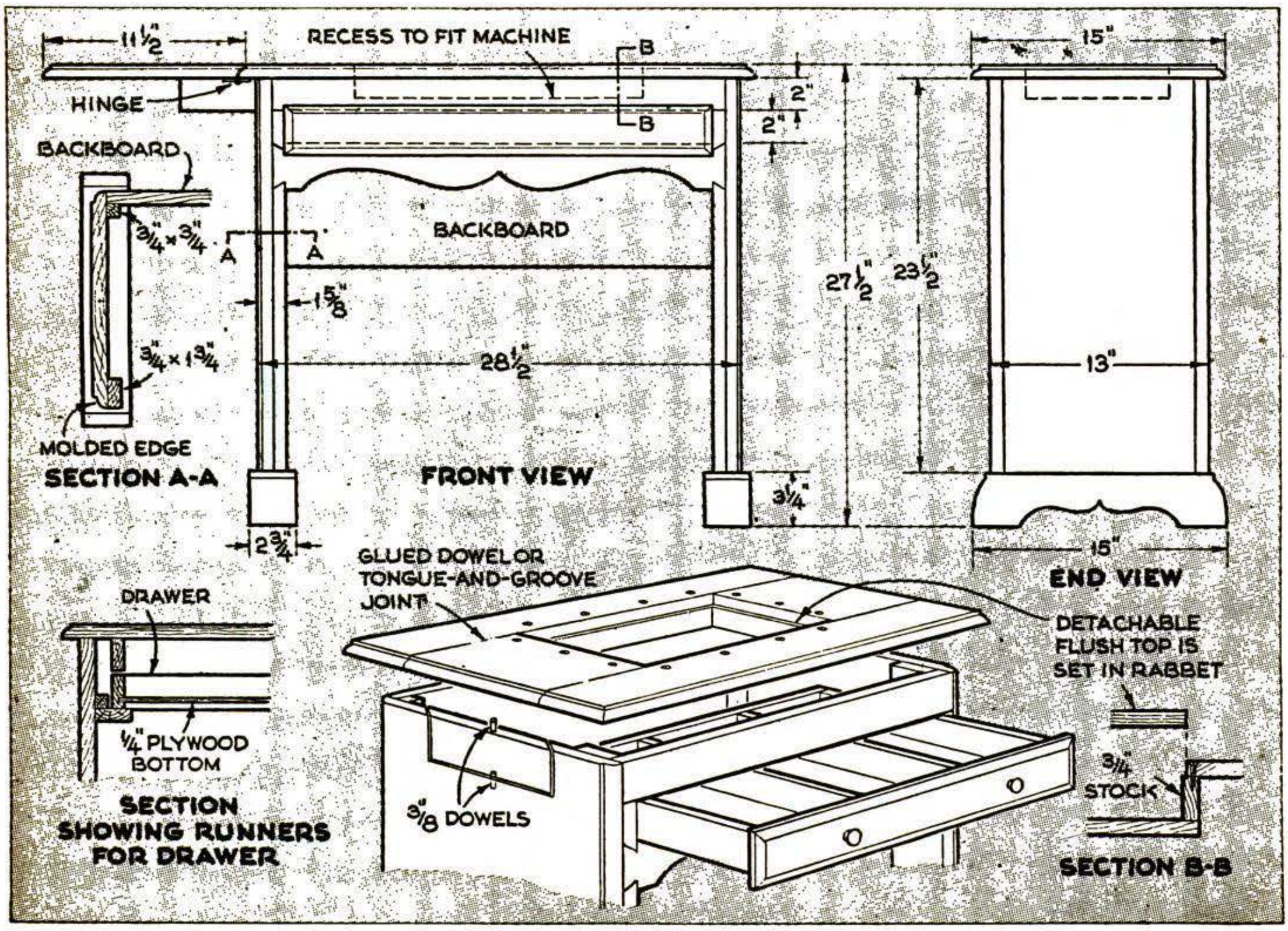

Copyrighted material

# TABLE for PORTABLE ELECTRIC SEWING MACHINE

WOMEN who use a portable electric sewing machine know the disadvantage of setting it up on an ordinary table. Not only is it difficult to find a table of the right height, but the sewing surface on top of the base is several inches above the table top so that the material cannot be spread out evenly during the work.

The top of this table has a recess, which should be made just large enough for the base of the machine to fit and deep enough for the sewing surface to come flush. It has a drop leaf at the left side that provides additional surface for holding large pieces of material. The leaf is hinged on the underside and is held horizontally when in use by a support pivoted on a hardwood dowel. A shallow drawer holds needles, thread, and other items.

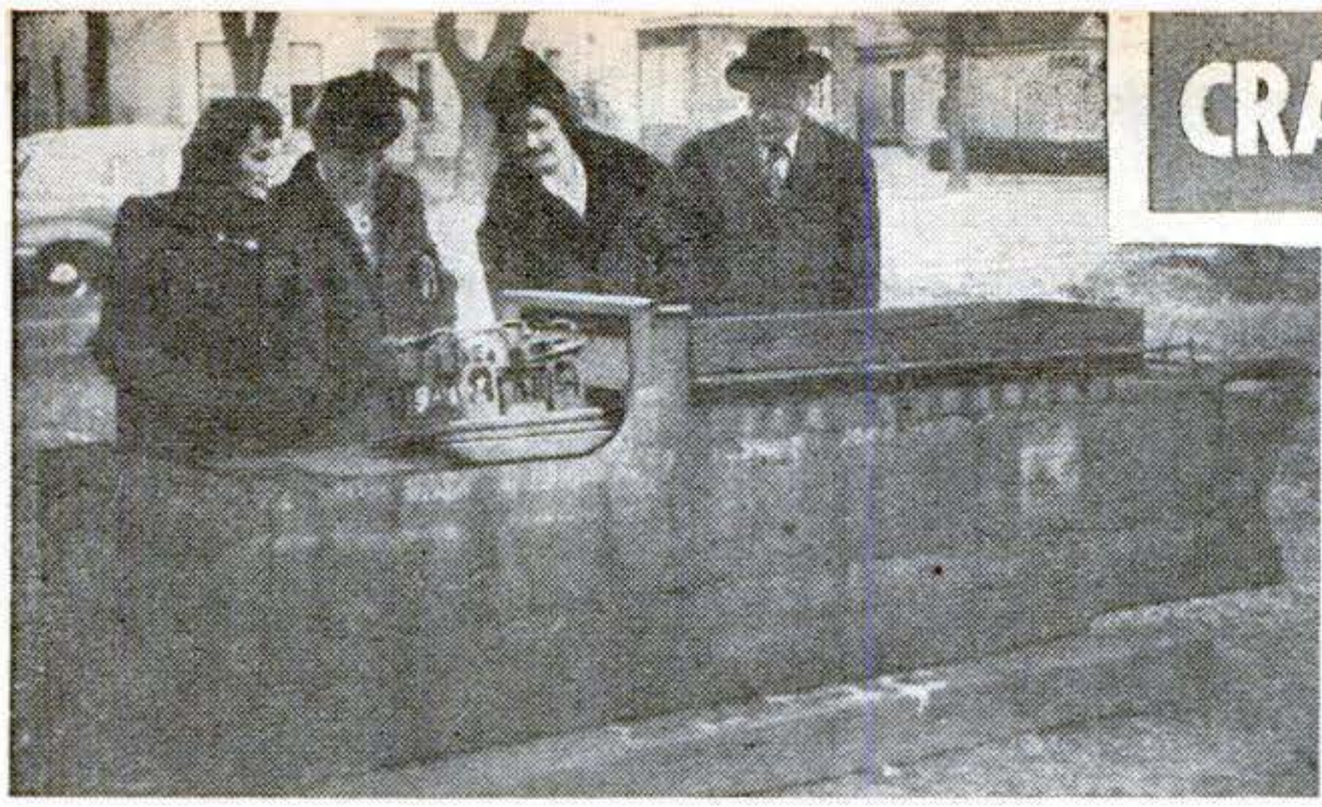
In making the table top, time can be saved if the pieces at the ends of the depression are cut to inside width and two side strips are glued and screwed in place, as shown. A board the same size as the recess may be made to fit in on legs and provide a flush top on desired occasions. All stock is pine except the feet, which should be made of hardwood.—HENRY R. DIAMOND.

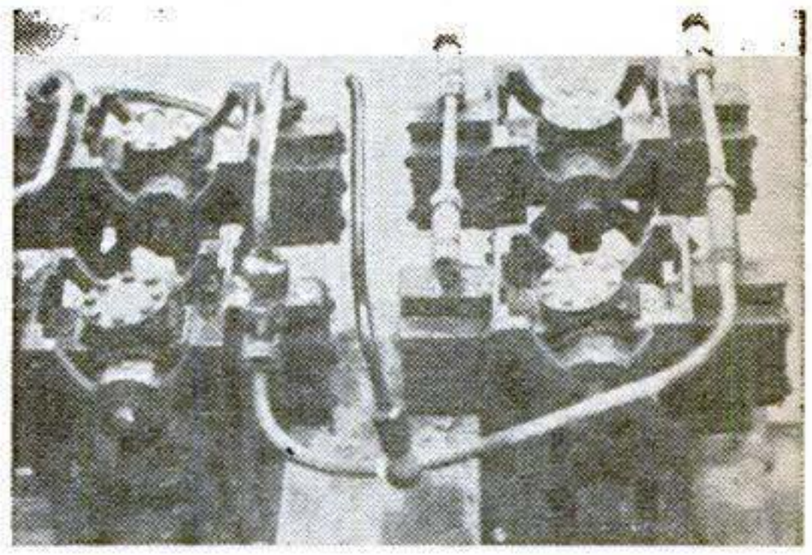





Copyrighted material

# CRAFTSMEN AT WORK





**PERPETUAL-MOTION SUBMARINE.** This one-man craft, discovered during the razing of a barn in Springfield, Ill., anticipated the Japs by several years and, to boot, was to have been run by a compressed-air perpetual-motion engine. Alfred T. Markwood, a railroad conductor, who once started a company to make perpetual-motion machines, was its inventor and secret builder. He left Springfield in 1927 for Detroit, where he died five years ago without revealing or launching his strange craft.

The boat measures 3′ in width by 12′ in length and is built entirely of galvanized iron. It was fitted with ballast tanks for use in submerging. Water for the tanks was to have been drawn in at the bow.

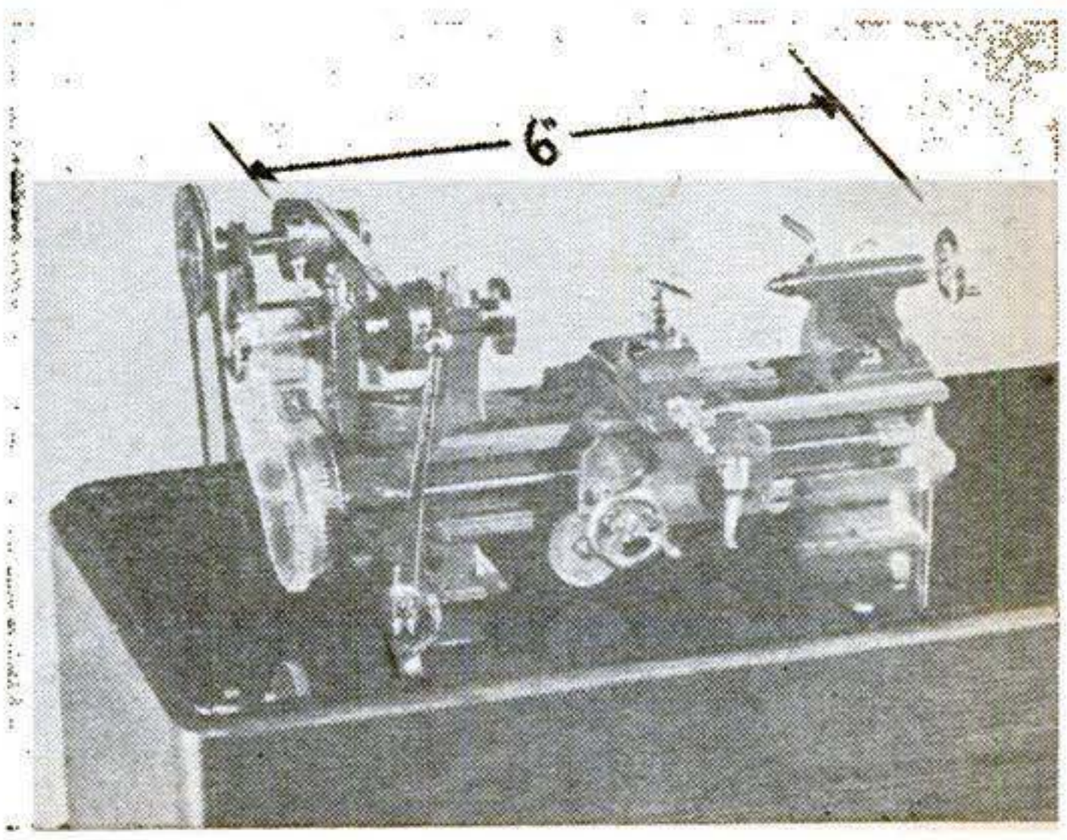
At right above is the perpetual-motion engine, made of bronze. Essentially a compressed-air motor, it was to drive two propellers and—on the familiar old lift-by-your-own-bootstraps fallacy—a compressor which in turn was to provide the air to run the engine.

**JEEP IN ACTION.** George McGinnis, of Goshen, N. Y., built the toy jeep shown here from plans in the December, 1945, issue of POPULAR SCIENCE. It's a pedal-propulsion model with many authentic features. "My boy likes it a lot, and many thanks," McGinnis said in submitting the photo.

**REAL TURNINGS 2½″ LONG** can be made on the miniature lathe shown below. The model, built by L. E. Bussey, of Dayton, retired civilian plane-engine superintendent for the Army Air Forces, has a 6″ bed and a swing of 1¾″. It is a complete engine lathe in every detail, including power feeds, back gears, and collet chucks of 1/32″ to ⅛″ capacity. Materials used in construction of the model were conventional—steel, cast iron, and bronze.

The walnut mounting base contains a line shaft and 115-volt motor. In operation, the motor runs continuously, and the lathe is started and stopped by a ball-tipped clutch lever near the headstock. The motor can be plugged into any 115-volt household outlet, and running is noiseless.

**LIQUID NOTES** come from this clarinet made from a length of garden hose and a kitchen funnel. Frankie Hilton, of Pueblo, Colo., used a regulation reed and mouthpiece in order to get music. The hose is holed for fingering.

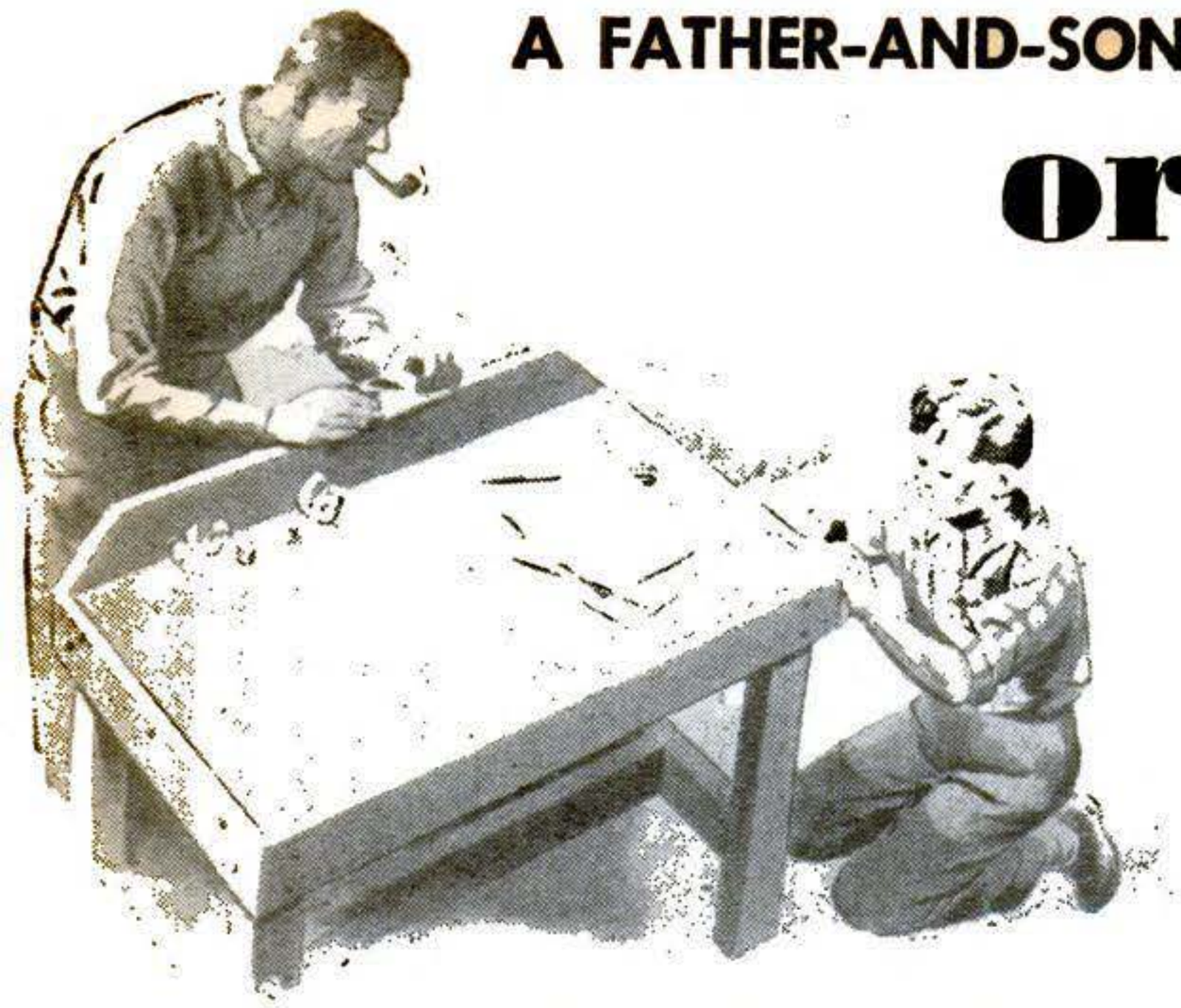





Copyrighted material

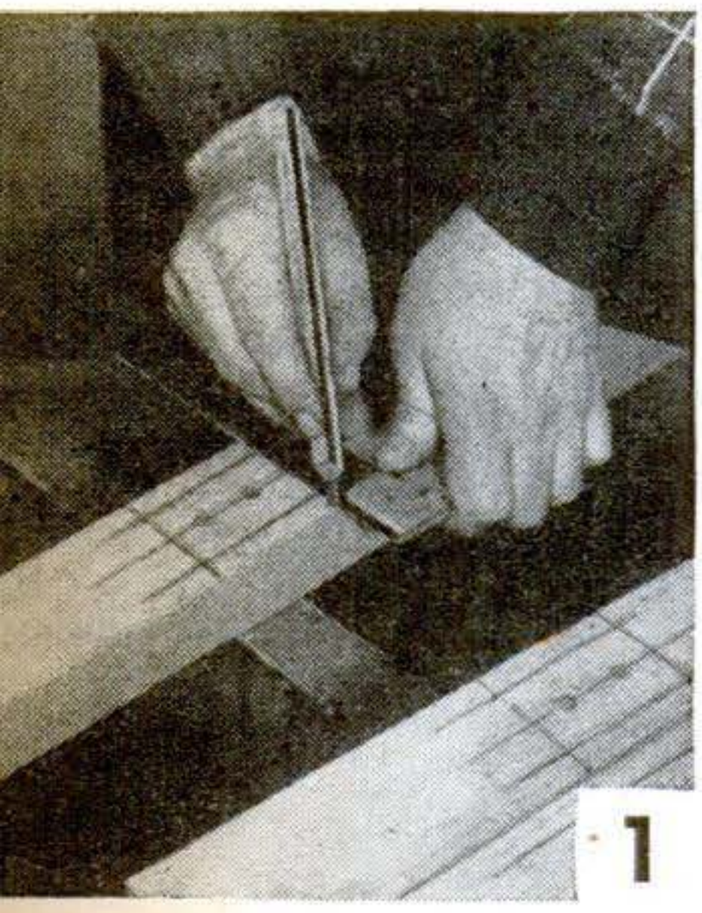
## A FATHER-AND-SON PROJECT

# orkbench for

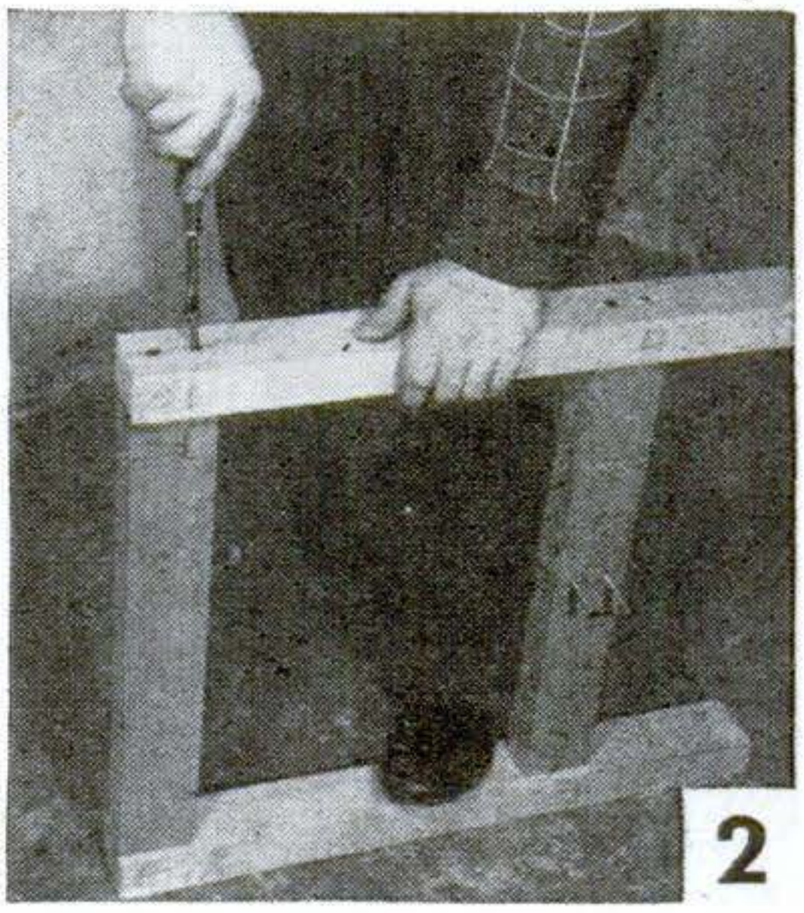


By PAUL J. ALLEN

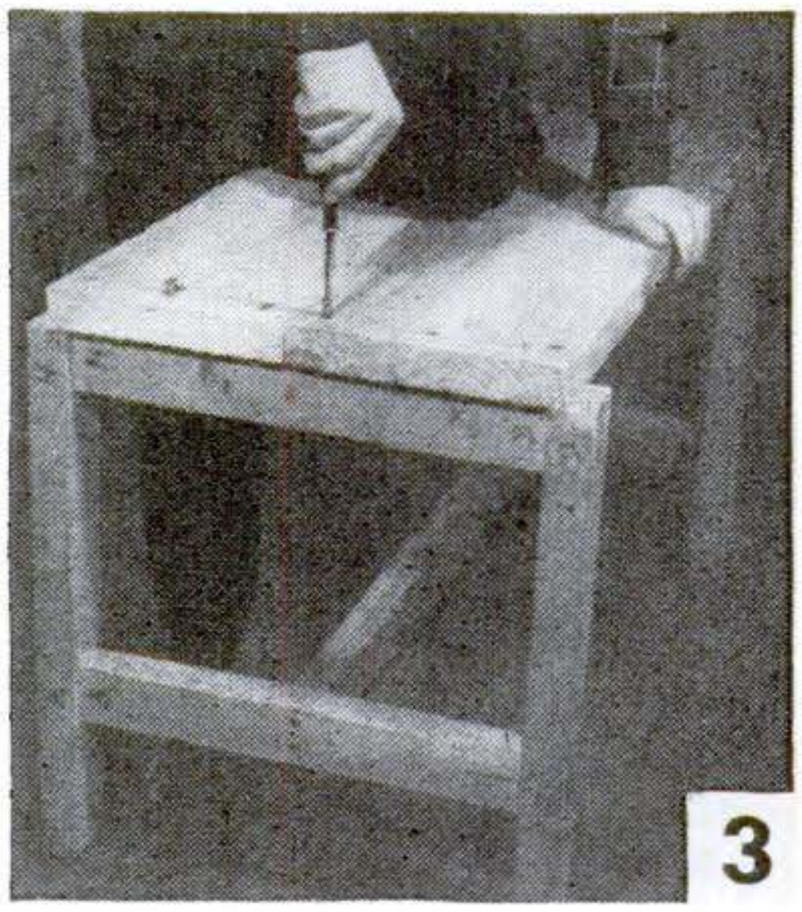
YOUR son deserves a good start in workshop practice. There's no better way of providing this than by giving him his own bench, preferably one he has helped build. The bench shown may be completed in a few hours with nothing more than hand tools, yet it will withstand a lot of abuse. It's a good idea to devise ways in which your son may help in its construction, for when you're through the interest thus aroused will help carry him forward.



1



2



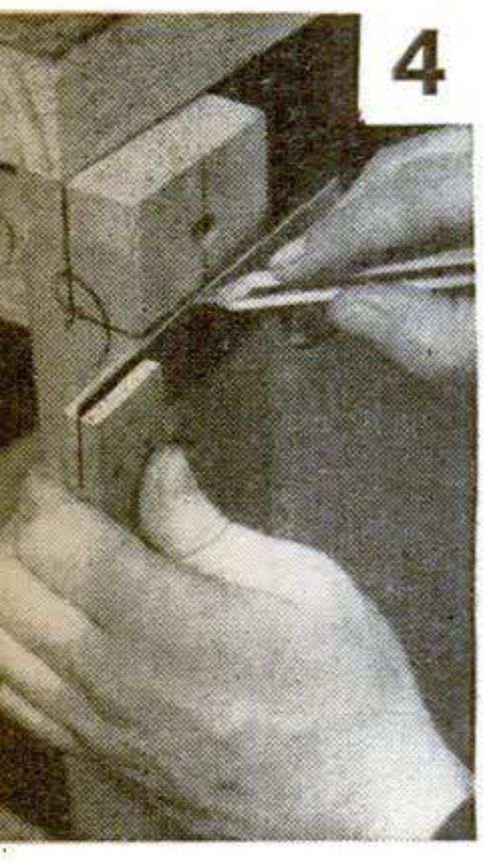
3

After cutting the legs and rails to length, mark the rail positions on the legs (1). Drill screw holes in the legs with a ¼" drill and in the rail ends with a No. 27 bit, marking all matching parts.

Assemble the ends (2) and fit, drill, and attach the 31¼" stretcher. Top planks may now be placed and installed (3), each corner screw being offset as shown in the drawing to clear the leg screws.

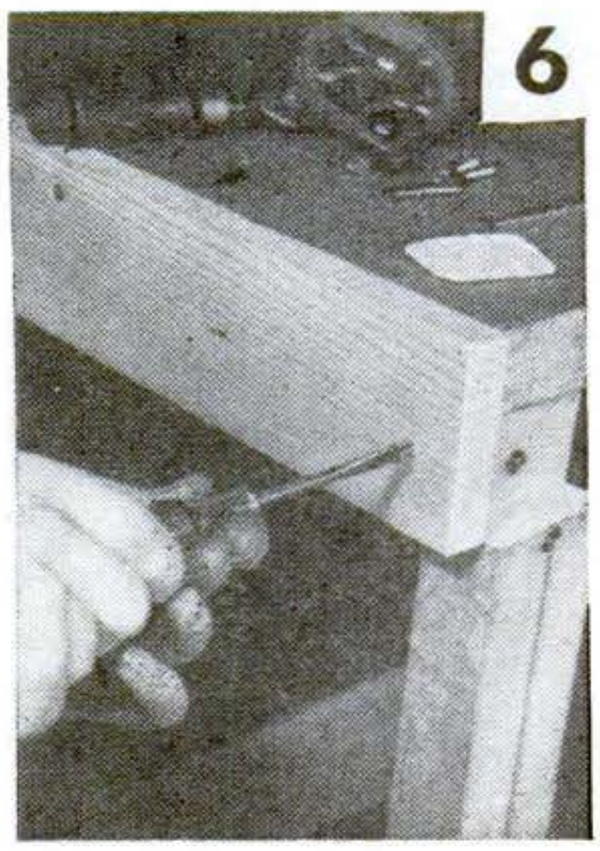
Remove the top screw from each leg, mark the end rabbets (4), and saw and chisel them out. Apply glue to the planks, allow it to become tacky, and put on and weight down the composition board (5).

Side aprons are attached (6) with the upper edges a little above the composition board and the ends protruding so they can be sawed (7) to give tight joints. Plane the edges even with the bench top.

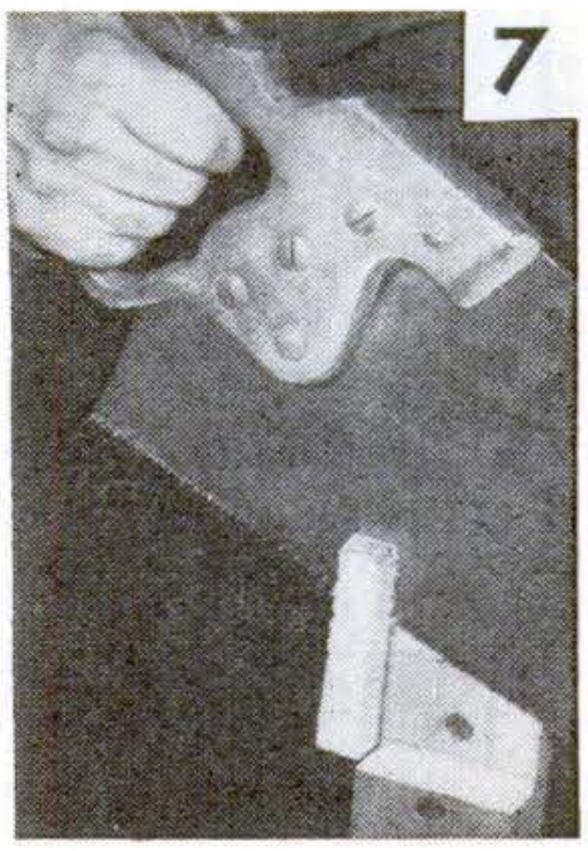


4

5



6

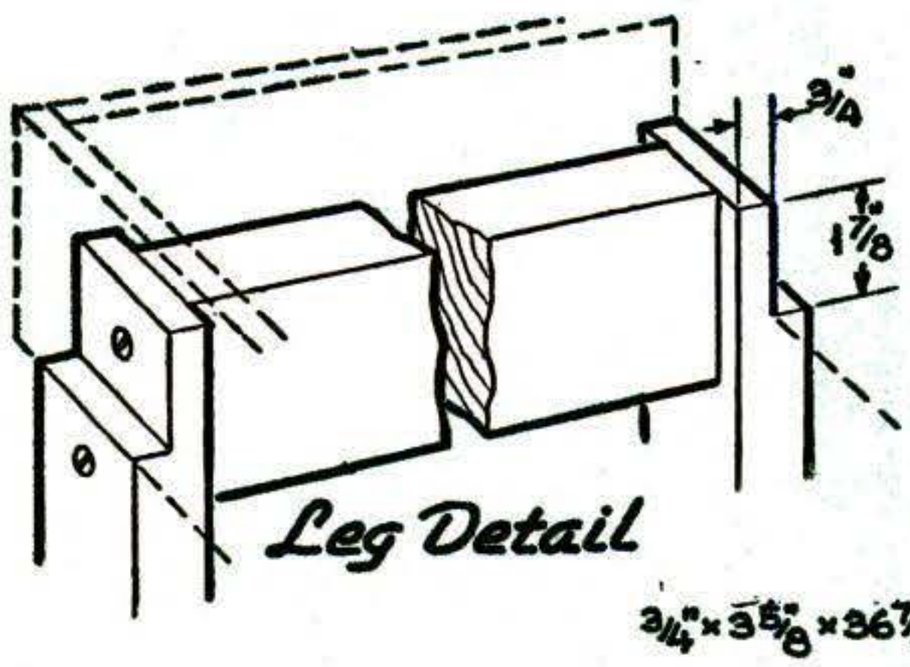


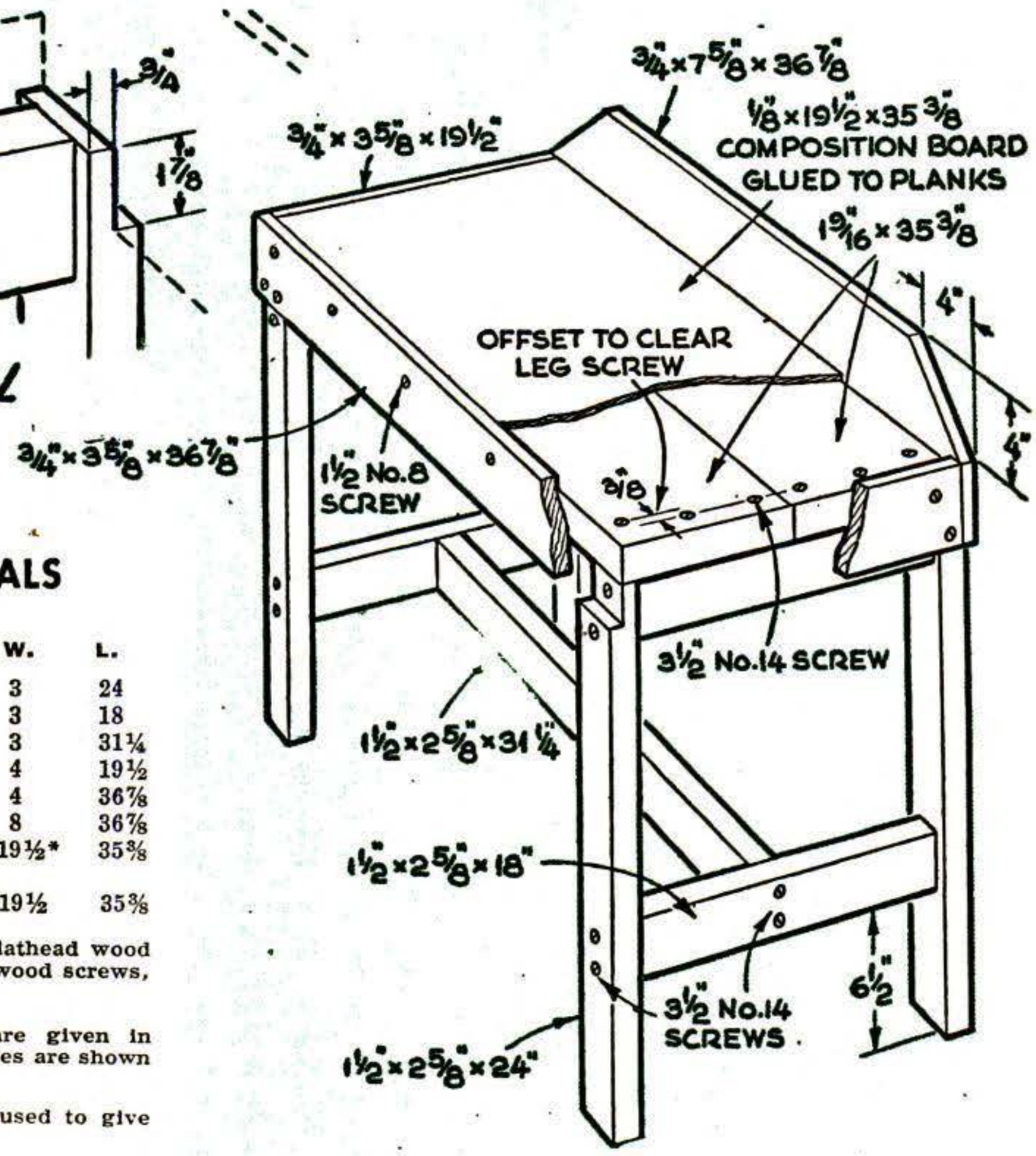
7



Copyrighted material

# the Young Carpenter




## LIST OF MATERIALS

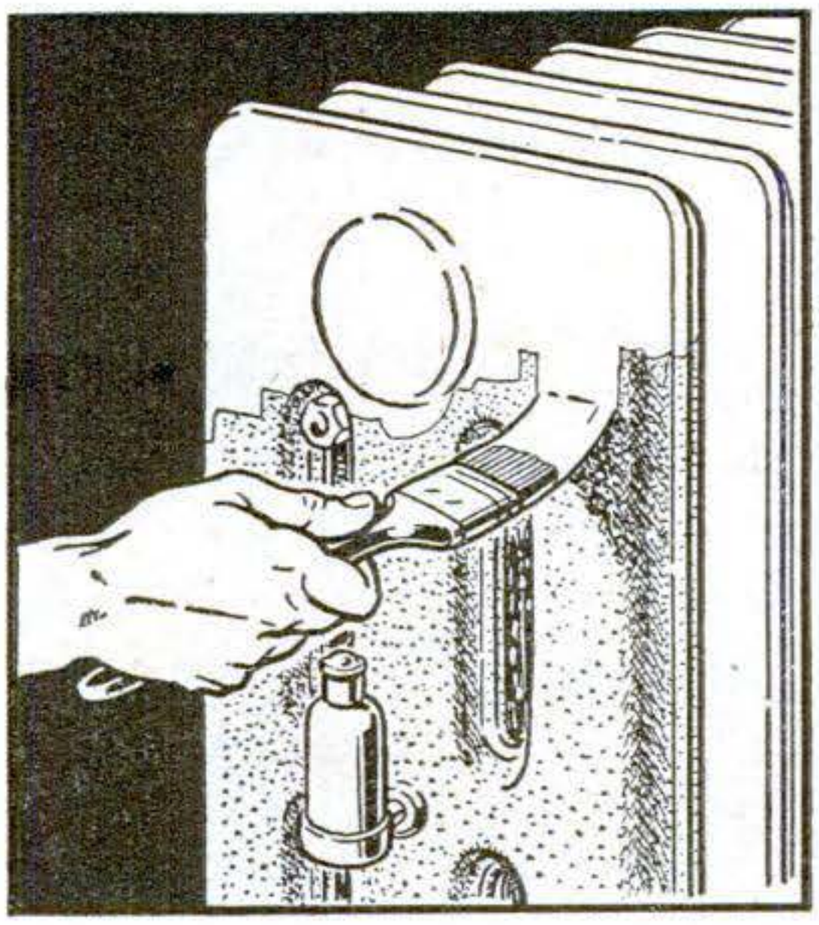
| No. Pc. | Description | T. | W. | L. |
|---|---|---|---|---|
| 4 | Legs | 2 | 3 | 24 |
| 4 | Rails | 2 | 3 | 18 |
| 1 | Stretcher | 2 | 3 | 31¼ |
| 2 | Side Aprons | 1 | 4 | 19½ |
| 1 | Front Apron | 1 | 4 | 36⅞ |
| 1 | Backboard | 1 | 8 | 36⅞ |
| | Top Planks | 2 | 19½* | 35⅜ |
| 1 | Hard Composition Board | ⅛ | 19½ | 35⅜ |

Miscellaneous: 28 No. 8 1¼" flathead wood screws, 34 No. 14 3½" flathead wood screws, 1 8-oz. bottle of glue.

Note: All dimensions above are given in inches for stock sizes. Finished sizes are shown on the drawing.

*Two or three planks may be used to give the total width of 19½".

## FINISHING RADIATORS AND PIPES [ *PAINTING* ]



1. Clean surface with sandpaper and steel scratch brush. Wipe with clean rags and denatured alcohol to remove all traces of oil and grease. Do not use gasoline.

2. Radiators, if new and unpainted, should receive a first coat of standard metal primer, which should be allowed to dry hard.

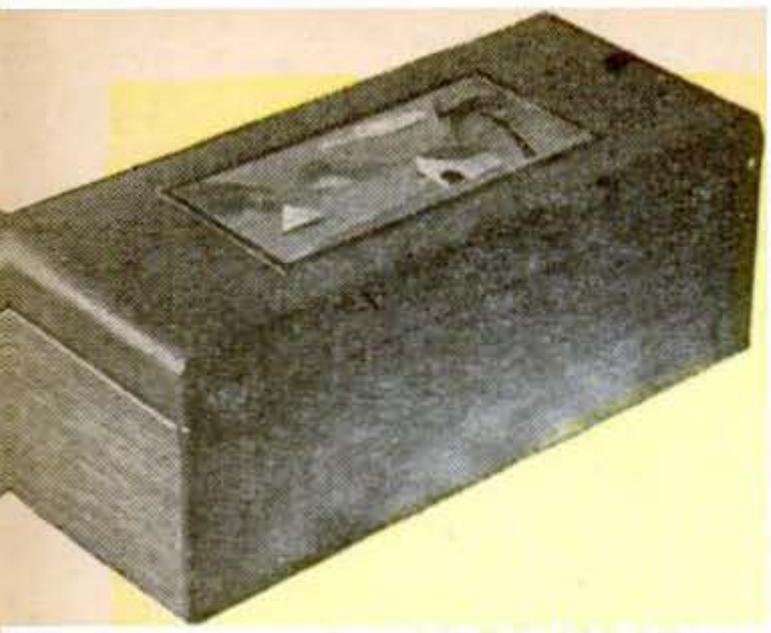
3. The finishing coats should be an eggshell or flat finish identical with the wall or woodwork of the room. This type of finish gives increased heat radiation. Avoid using bronzes, if possible, because they cause a definite loss in heating efficiency, particularly on radiators.

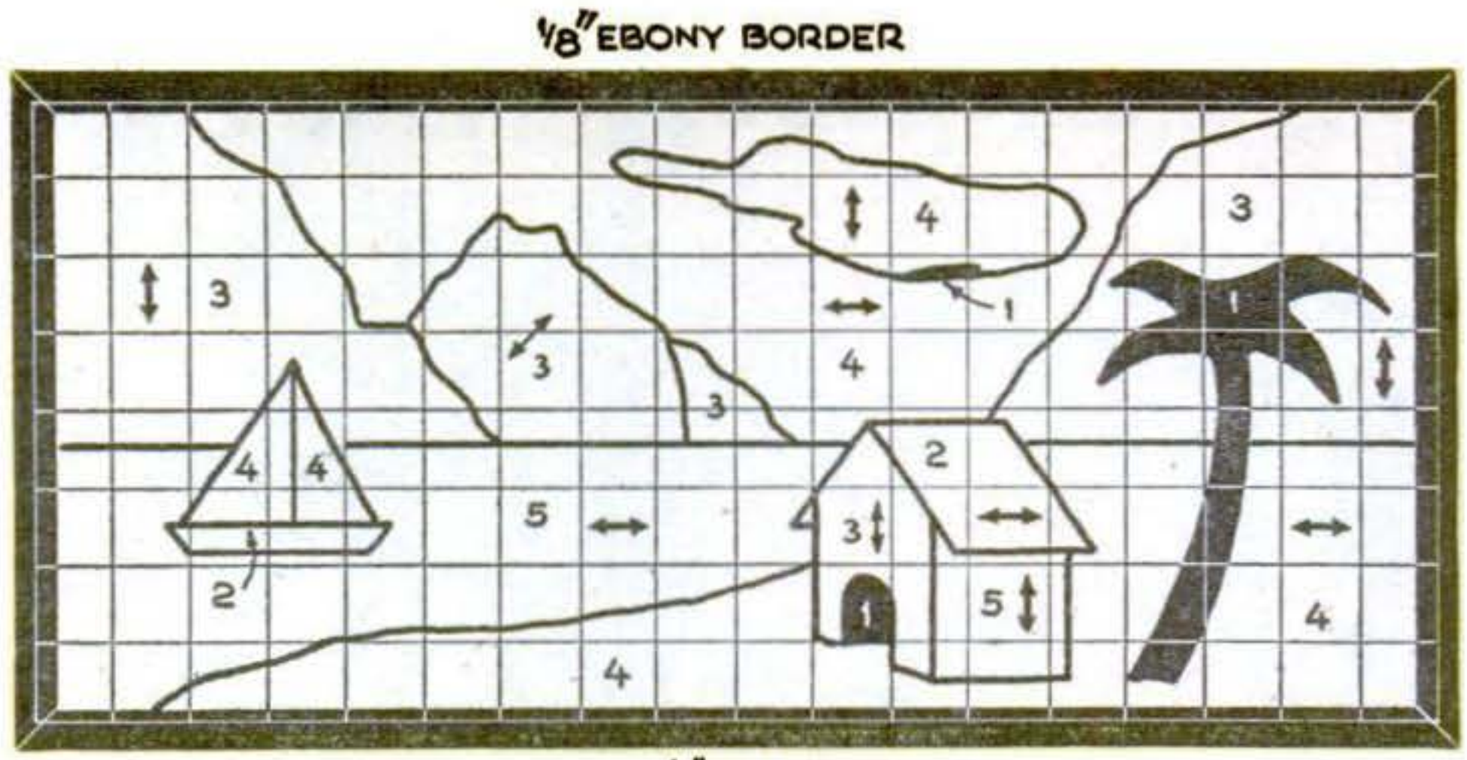
4. Allow all possible time for drying before the heat is turned on, and then bring the heat up slowly over a 12-hour period.

POPULAR SCIENCE MONTHLY SHOP DATA



Copyrighted material






## Tropical Scene Inlaid in Five Woods Decorates Jewelry Box

WHILE stationed in the Philippines, I decided to try my hand at a job of simple inlay. Here's what resulted—a tropical scene on the cover of a jewelry box that I made from a wood resembling mahogany.

In this five-wood inlay, I blended ebony, the white part of ebony wood, teak, walnut from a gunstock, and cigar-box wood, running the grain of each piece in the direction that would give the best separation from and contrast with adjoining pieces.

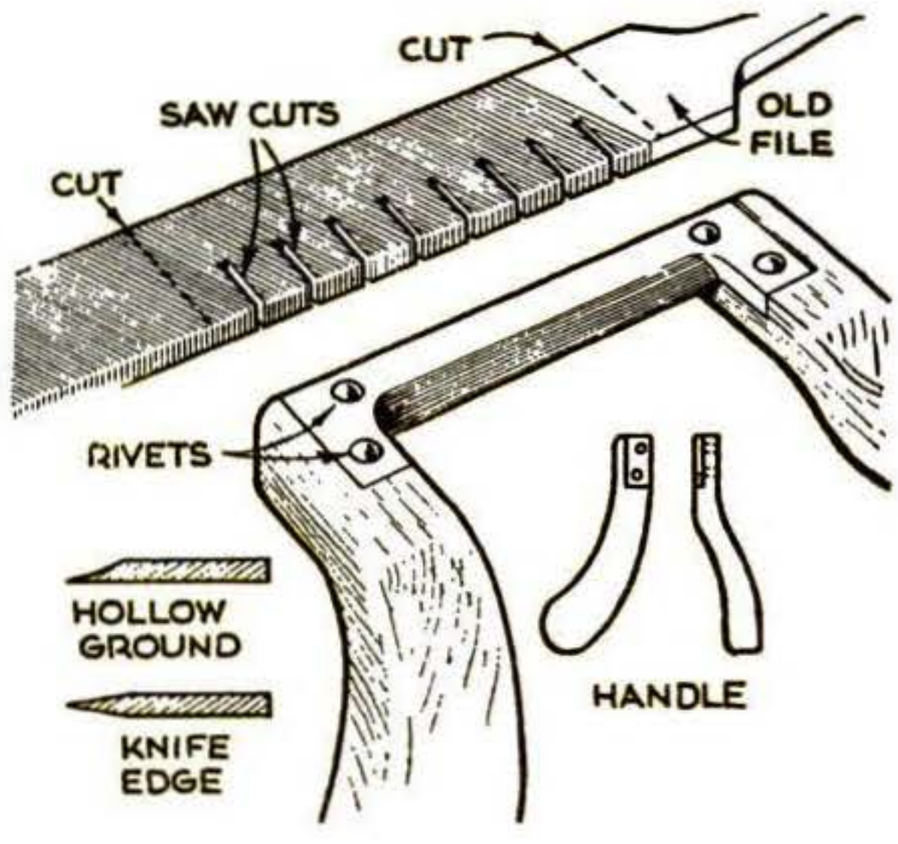
Sides, ends, and the bottom of the box were cut from 5/16" stock, the box standing 2⅜" high and being 3⅞" wide and 8⅜" long. The inner face of the ¾"-thick cover was hollowed to a depth of ⅛" with a lip of about ¼" around the edges. Heart-shaped hinges were cut from silver coins pounded flat, and a silver chain from an identification bracelet attached to the inside of one end of the box keeps the lid from falling back.—EMIL GAYNOR.

## Tweezers Bent from Scrap of Plastic

BECAUSE of its springiness, plastic is a good material from which to make a pair of tweezers. A scrap of ⅛" plastic an inch or so wide and 13" long will do for the job. Taper the width of the piece from ¾" at the center to ¼" at the ends, being careful to get the two halves identical. Bevel the ends with sandpaper. Heat the plastic in an oven to about 300 deg. F., remove it with gloved hands, and bend in the center so the ends meet squarely.—FRANK SHORE.

## Blade for Handy Midget Spokeshave Is Made from Old File

MODELMAKERS in need of a small spokeshave can make one from an old flat file. Heat the file red hot and allow it to cool slowly to soften the metal. Mark the length of the blade with a cold chisel, hacksaw parallel slots about 3/16" apart, and knock out the lugs. File or grind the steel to a hollow-ground or knife edge, saw off the excess metal at both ends, and drill holes for rivets. Harden the blade by heating it evenly until red and plunging into water; then temper by reheating until a spot on the edge previously polished with abrasive cloth turns a brownish purple. Immediately quench in a mixture of two parts of motor oil and three of linseed oil. Hone the blade and mount it on maple handles.—JOSEPH ROTH.

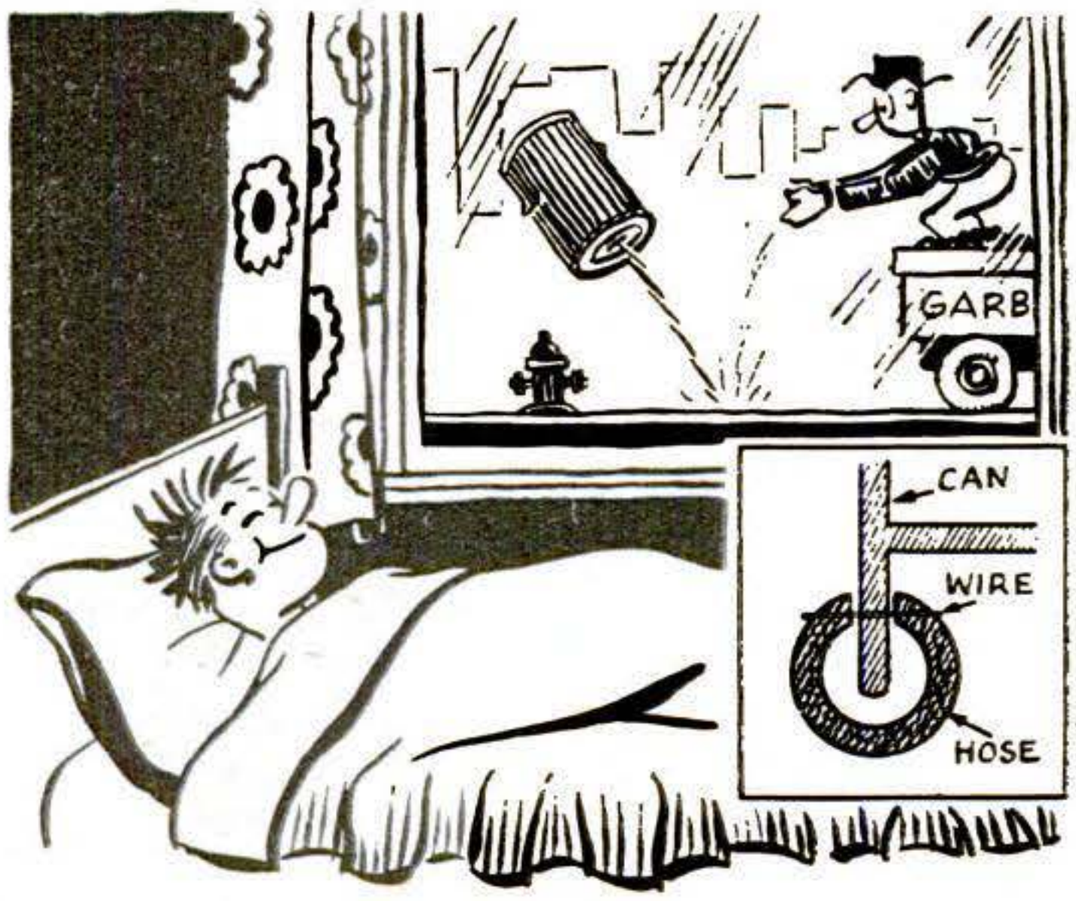





Copyrighted material

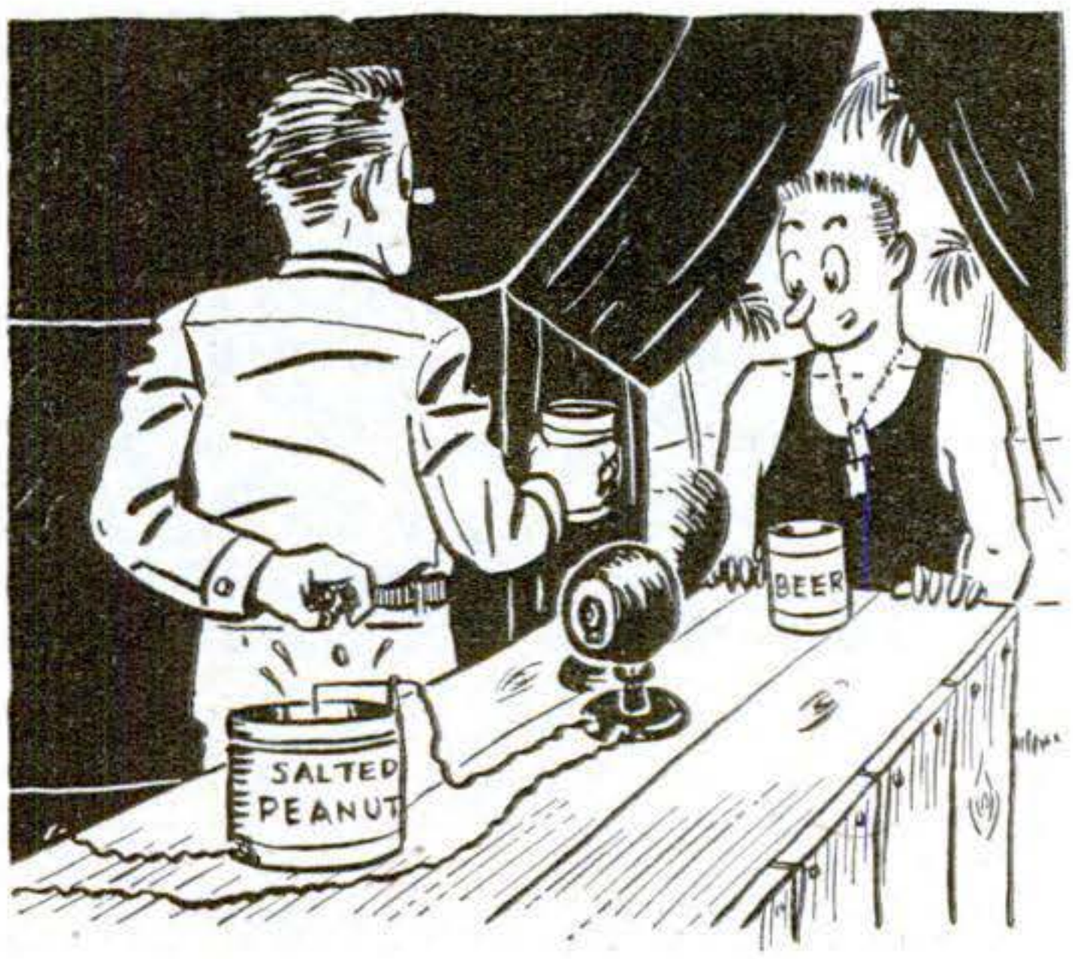
# WHAT'S YOUR INGENUITY QUOTIENT?

*Have you pulled off a smart one lately? We will pay for each contribution accepted for this page showing ingenious solutions of problems in the home, shop, garage, or camp. It doesn't matter if it's wacky—if it works.*



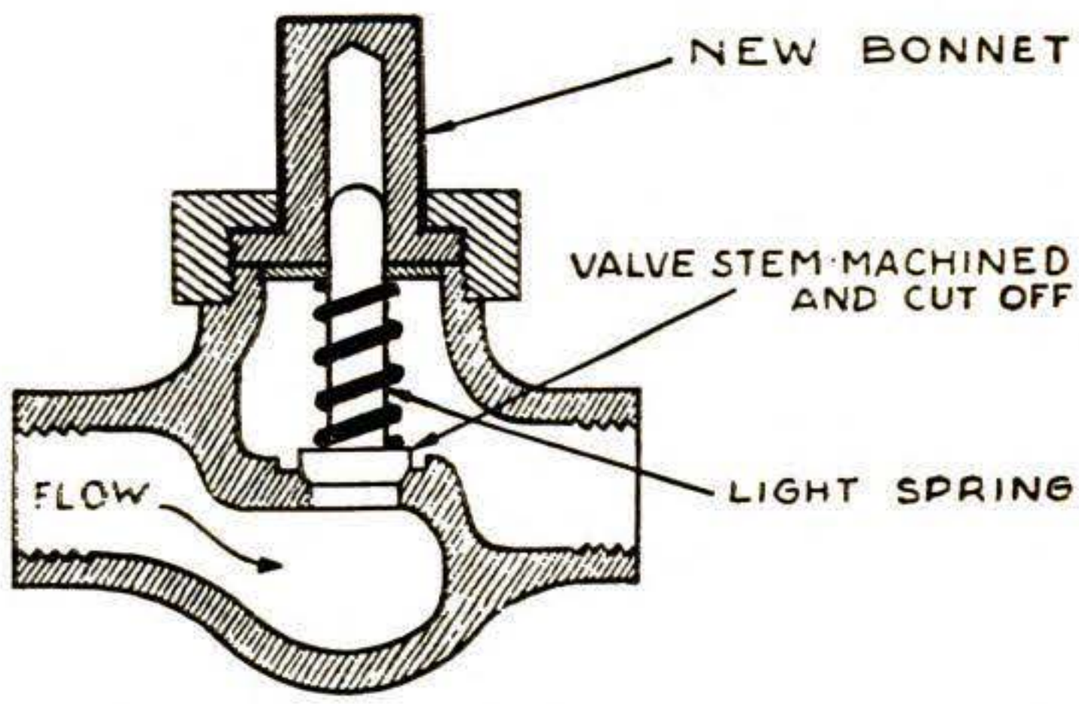

**GARBAGE GAITIES,** the hilarious game the collection crews play under my window at dawn, may be a lot of fun to them, but not to me.

During one of the noise-filled sessions, I dreamed up this idea of slitting a rubber hose and wire-lacing it to the bottom rim of a can. It has proved to be a bang-up as well as a clang-free success.—IRA MINOR.



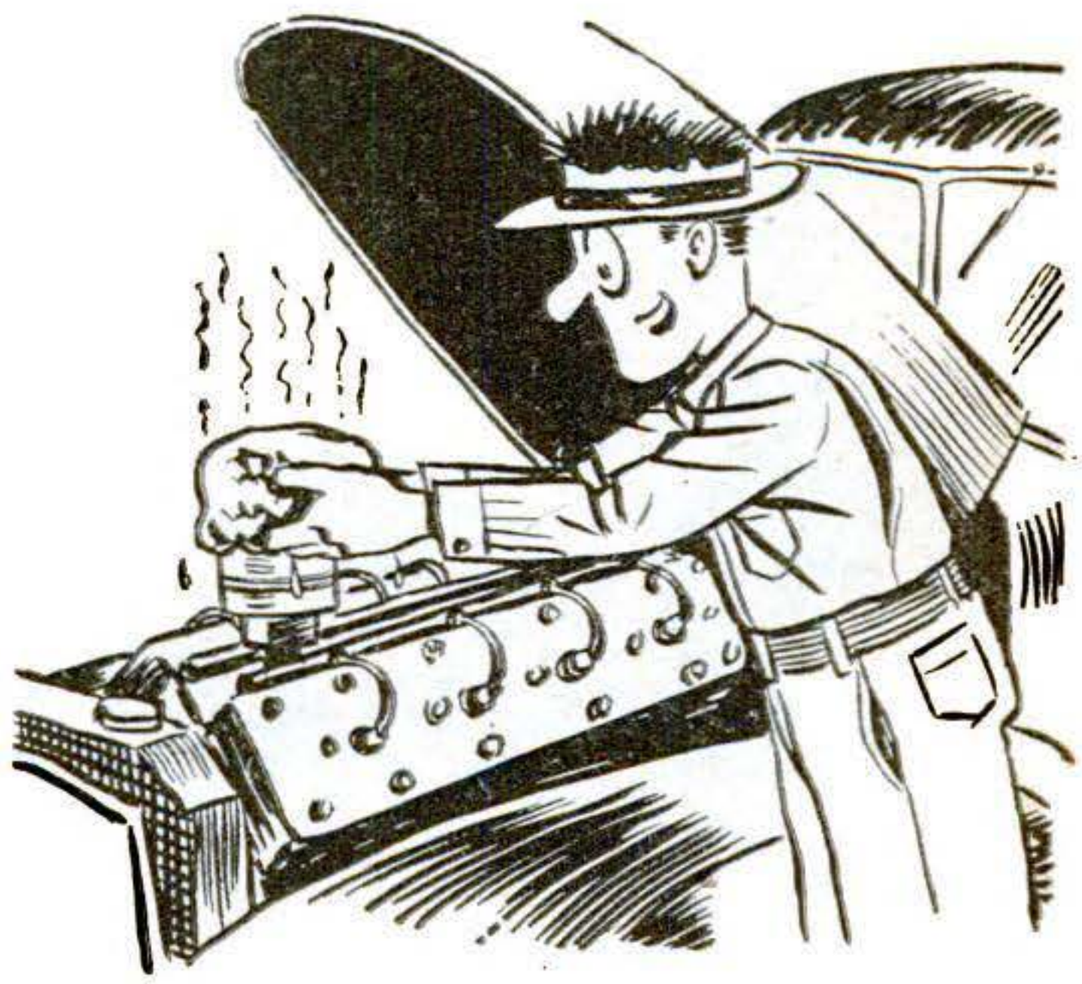

**WELL, BLOW ME DOWN!** The fans we salvaged from smashed vehicles in Burma turned out to be souvenirs instead of breeze machines. They needed 24 volts, and we had 115. A water-filled can gave me the makings of a water rheostat, but at first the fan didn't run. Those who smirked stayed to stare, though, for I flipped salted peanuts into the can, making the water conductive—and starting the fan.—J. J. STANKOSKY.

**IN HER BRAND-NEW BONNET,** this globe valve looked like the prettiest thing aboard our ship. When a check valve checked out, leaving us in a lurch, I shortened a globe-valve stem, machined off the threads, and also machined a new bonnet. The addition of a light spring permitted the valve to operate in a vertical as well as a horizontal position.—ROLAND D. CUSHMAN.



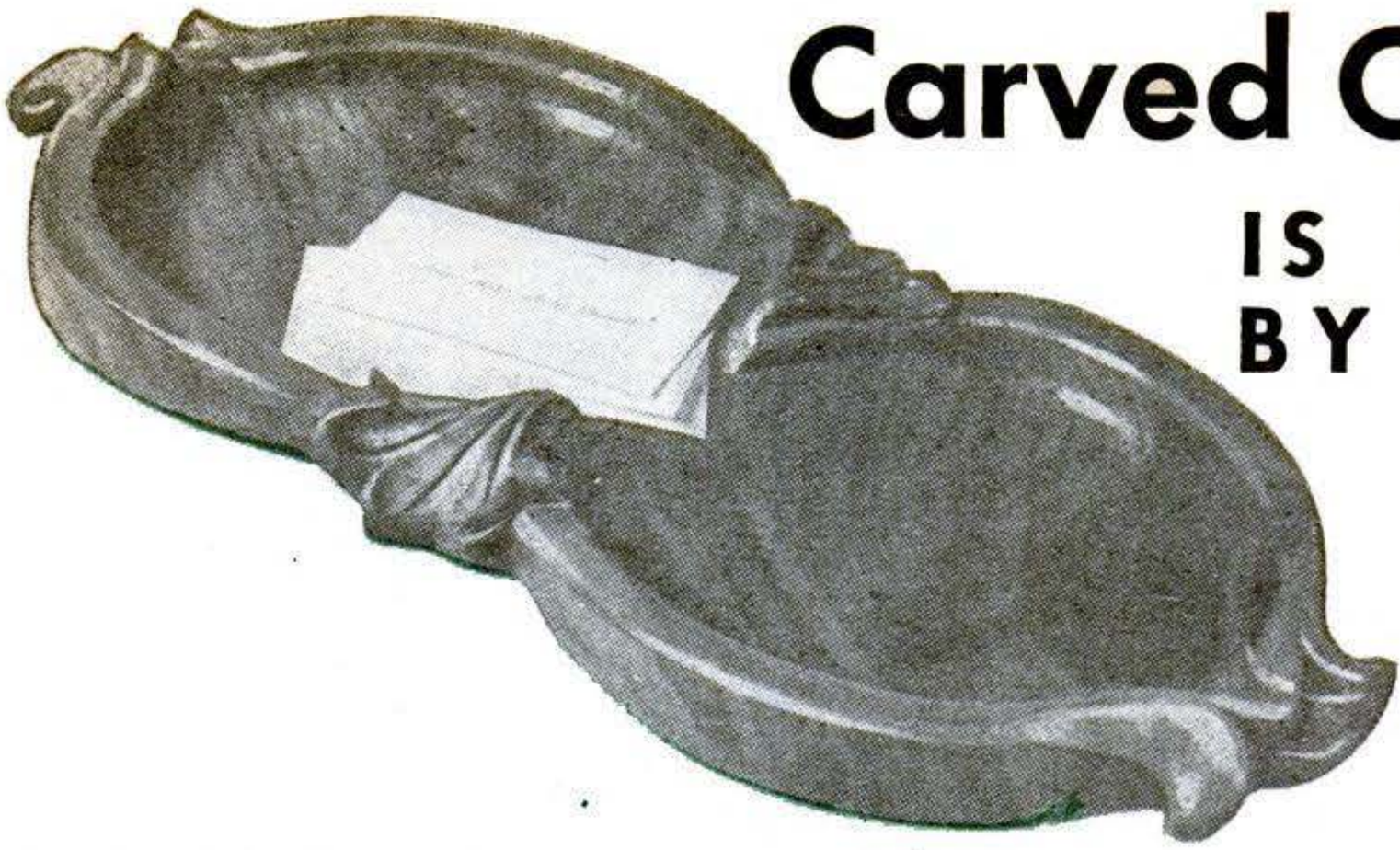

**KEEP THIS UNDER YOUR HAT,** but if you ever have to get a dead-storage car started, here's a trick I've used. First remove the air filter and wedge the choke open. Then cover the carburetor with the crown of an old felt hat and saturate the felt with about an ounce of gas.

When the starter is pressed, suction from the cylinders vaporizes the gas through the felt and starts the engine pronto. It runs long enough to fill the fuel line and start the pump delivering gas.—R. L. GOUDREAU.





Copyrighted material



# Carved Card Tray

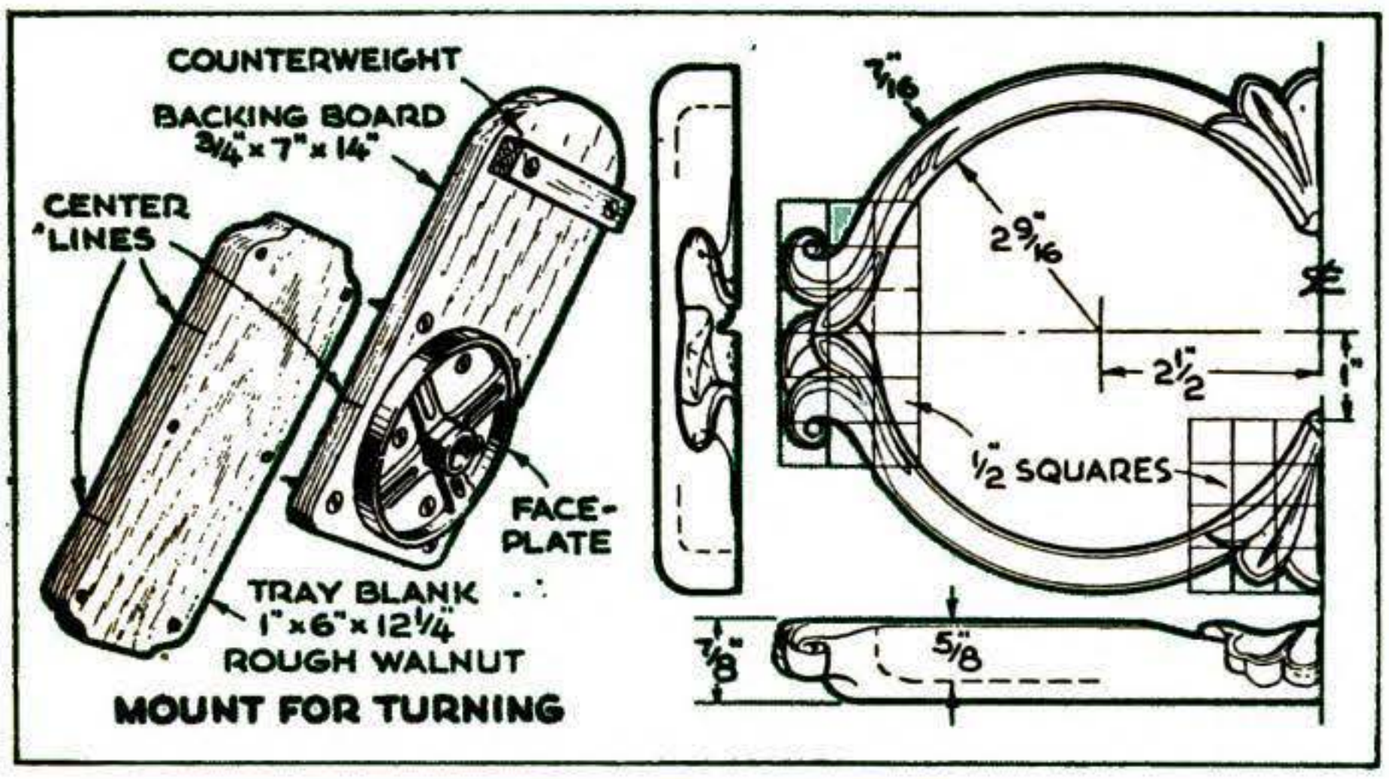
## IS HOLLOWED BY TURNING

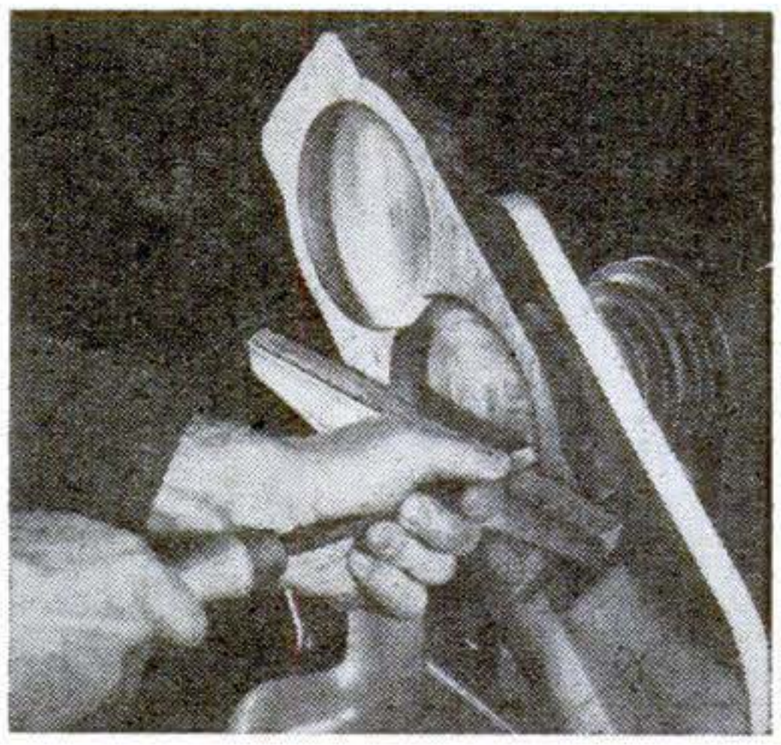
FOR THIS little card tray a gnarled and crossgrained scrap of rough 1" walnut or mahogany is just the right stock. Plane the piece to a ⅞" thickness, transfer the pattern outline, and cut it roughly oversize.

Pockets are turned by screwing the blank to a pine backing board mounted on the outboard end of the lathe spindle. The board acts as a counterweight to reduce vibration. Belt the lathe for slowest speed, tuck up your loose cuffs, and stand well back while turning. If there is still vibration, screw a cleat on the pine board to increase the counterbalancing effect, shifting its position until fairly smooth running is obtained. Reverse the tray on the backing to turn the second pocket, checking the contour with a cardboard template cut to match the first.

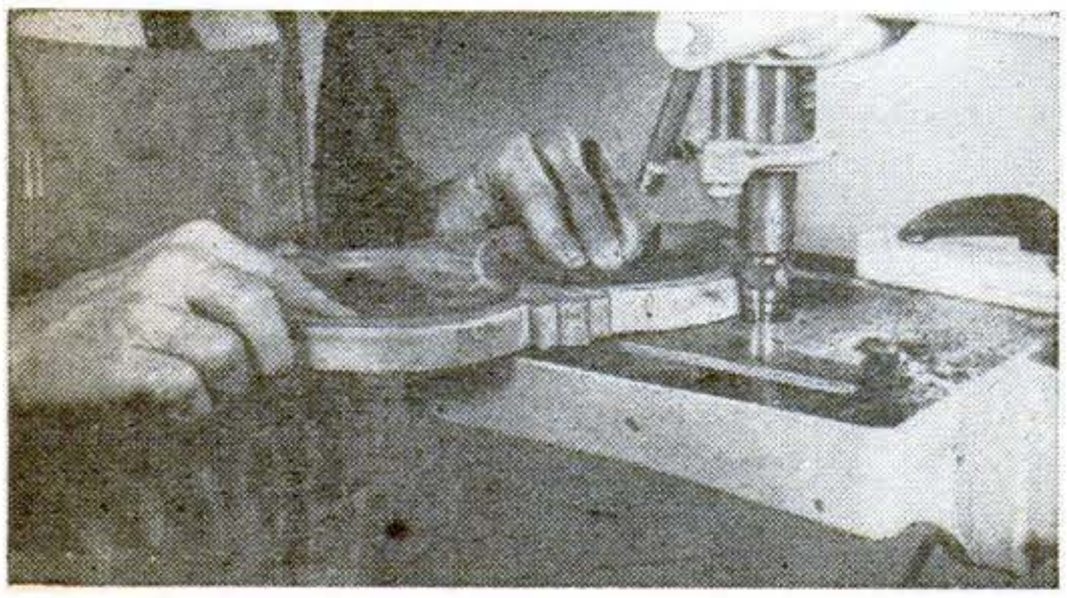
When the turning is finished, transfer the full pattern to the work and scroll-saw the edges. Smooth them and run against a small quarter-round shaper cutter. In doing the carving, outline with a veining gouge and then hollow the center leaves. Carve with long strokes, carrying out the effect of stem butts that branch around the pockets and terminate as overlapping leaves.

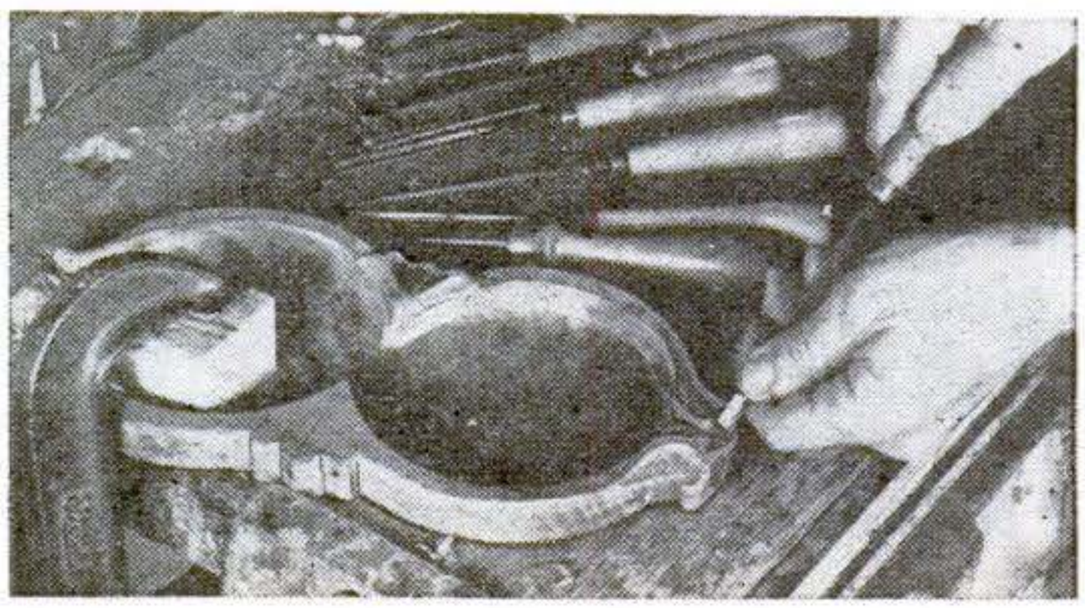
Sand only inside the pockets. Finish with two coats of shellac and one of wax. Then glue felt to the bottom.—EDWIN M. LOVE.



**Pockets are formed on a lathe by mounting the tray blank on a projecting backing board that acts as a counterweight to reduce vibration. The edges are shaped with a quarter-round cutter. Leaves are carved.**







Copyrighted material

# A Sturdy Bandsaw Base

By C. W. WOODSON

FOR the average home shop, a small bandsaw is most convenient to use and gives best results when it is mounted on a substantial individual base. Having its own stand and motor permits the saw to be moved about the shop as occasion demands freeing it from the space limitations of a permanent place on the bench.

Soundly designed to be built of heavy stock, the base illustrated here will furnish solid support for the saw as well as housing for the motor. The legs are made of wood 3½" square, rounded on one corner, and mortised for side and end rails. Waste two-by-four stock is used for the rails.

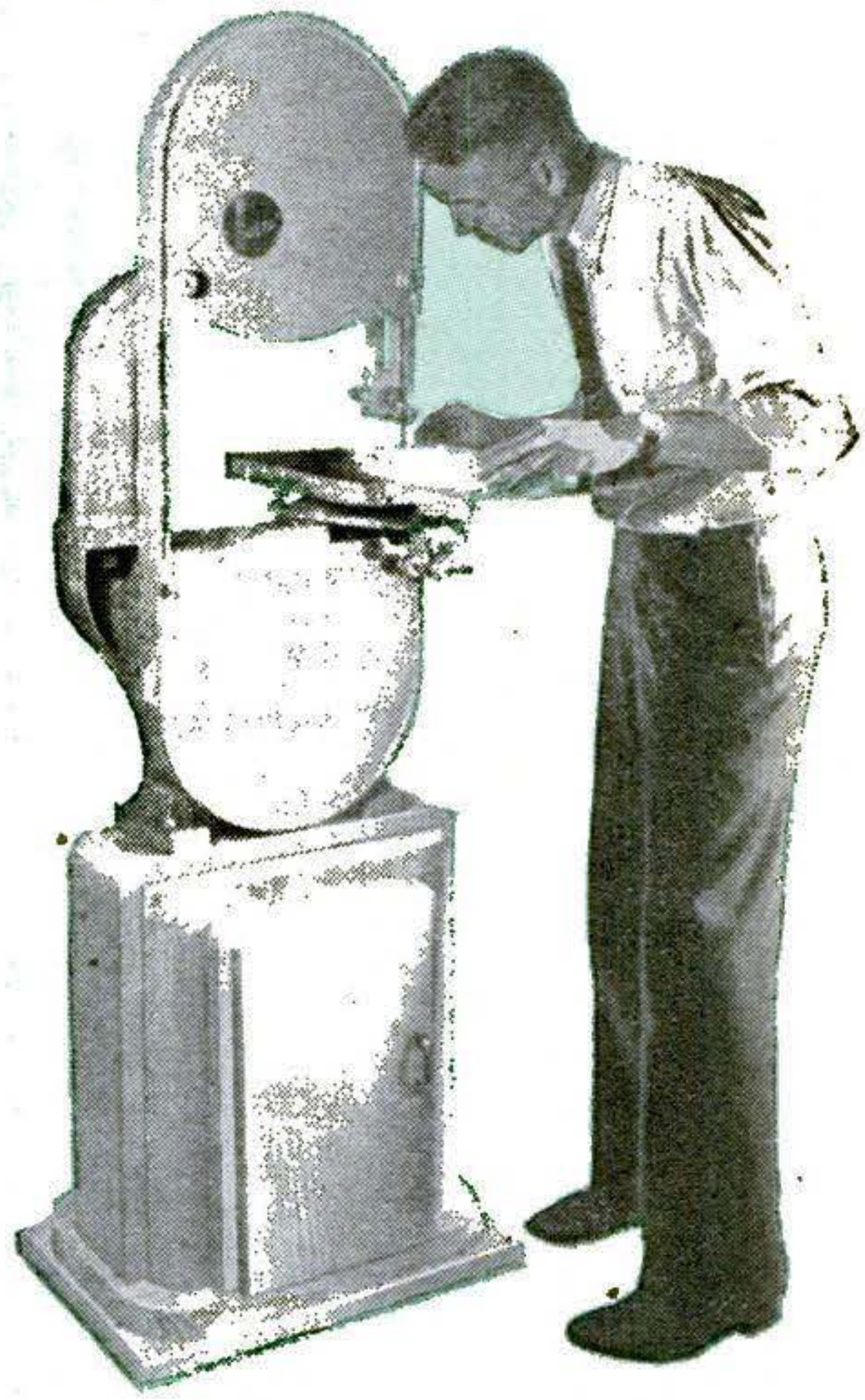
All frame parts, with mortises and tenons cut, are shown in the dimensioned photograph at the lower left. In the center view the top and base have been added to the assembled frame, and a ⅞" by 11" by 17" shelf has been notched in place to support the motor.

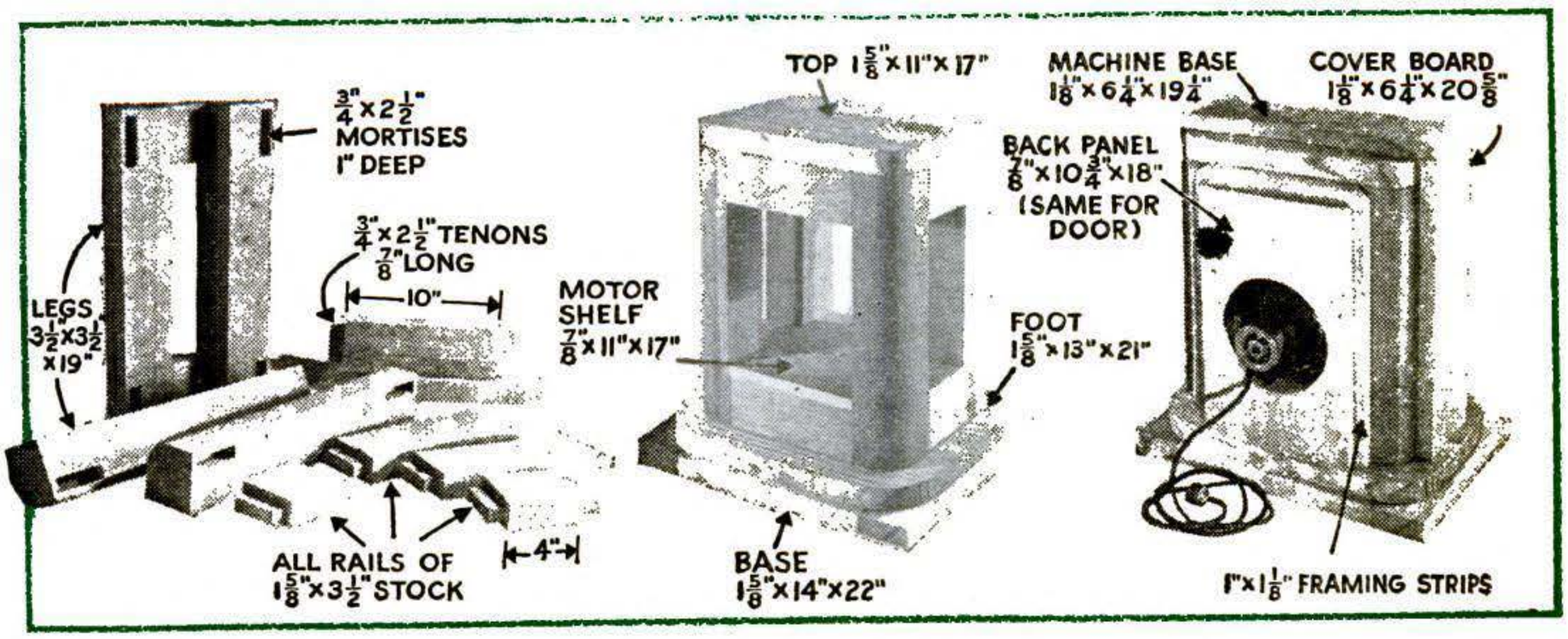
Rounded-corner baseboards are fastened to the frame with glue and long screws that run into the bottom of the cross rails; screws are not driven into the end grain of the legs.

Front and back openings are built out with 1⅛" framing strips to increase the space allowed for the motor. A panel with a large circular hole is used to cover the back, as shown in the picture at the lower right. Screw fastenings make it possible to remove the panel easily when it is necessary to get at the motor. The front is closed by a hinged door as shown in the photo at the upper right.

Cover boards on both sides complete the enclosure and add to the attractiveness as well as the strength of the design. Bolt the bandsaw in place on top of the machine base.

For metal cutting, a speed-reduction jackshaft could be bolted in an inverted position under the top of the cabinet.



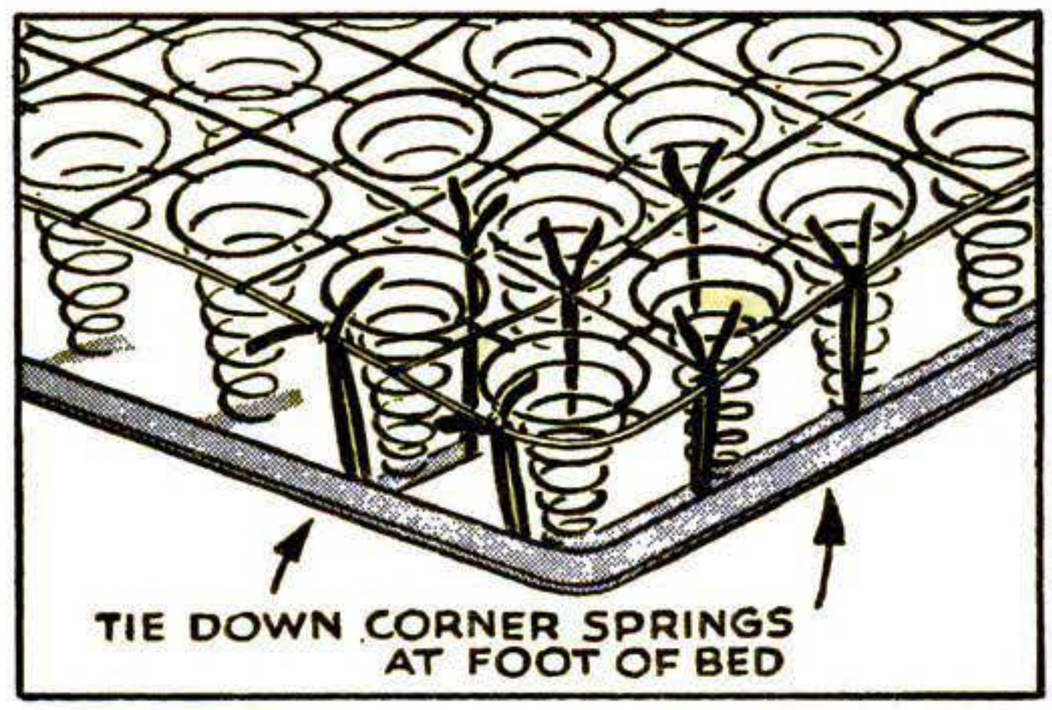




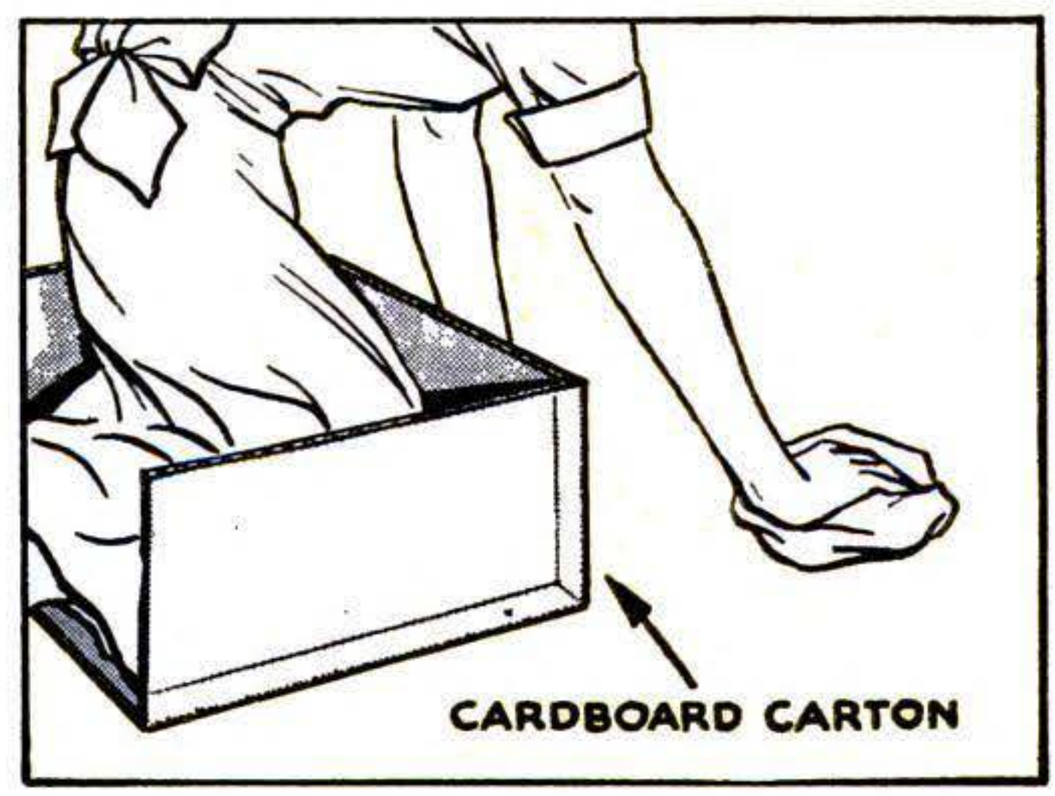

Copyrighted material

# KEEPING

Paint rollers provide an economical and easy method of applying liquid wax to linoleum. Drill a hole in a broom handle for the roller arm and the waxing job can be done from a standing position, as shown.

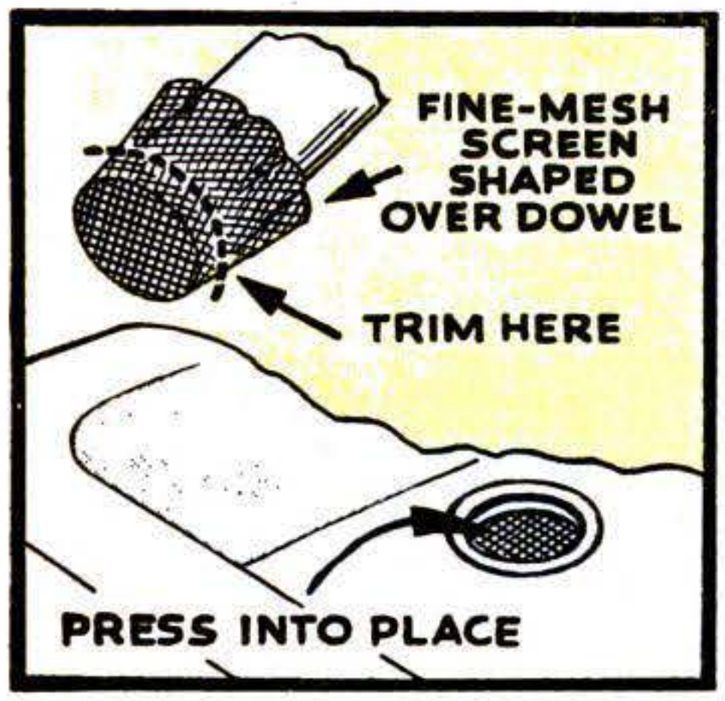



Unsightly humps often occur when bed clothes are tucked under at the bottom corners. Tying down two or three springs at such corners so they are slightly compressed will lessen this annoyance.

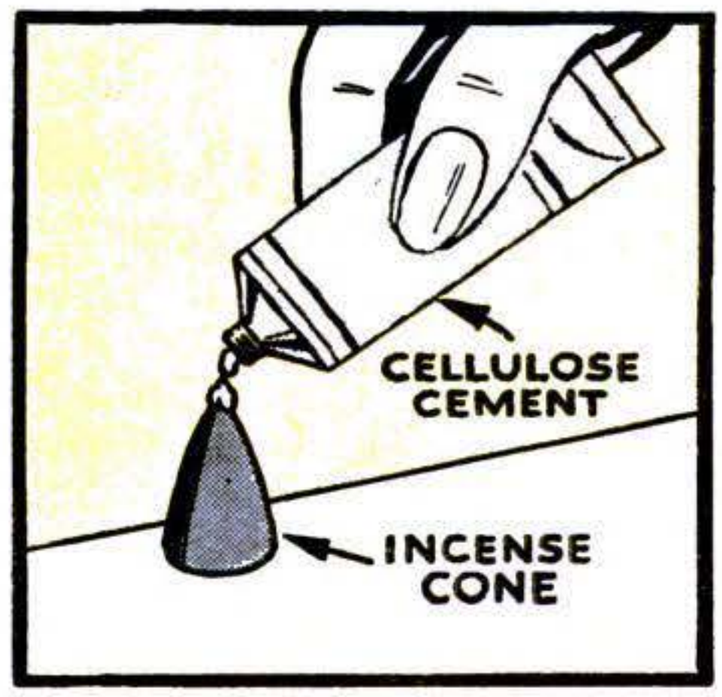



Cut one side of a cardboard carton at the corners, bend this side flat against the bottom, and you have a kneeling pad for use in scrubbing or mopping floors. The ends and side protect clothes.

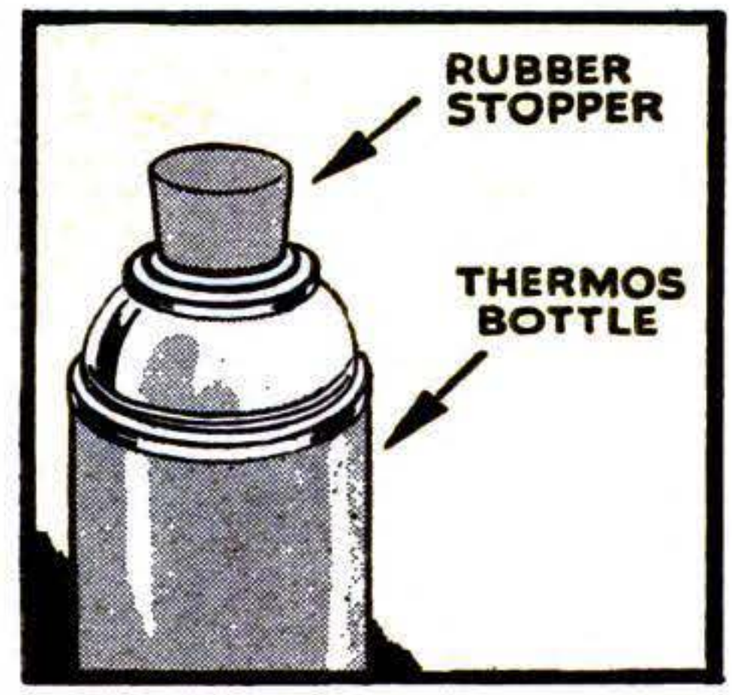
Fine-mesh screen, shaped and cut as below, makes a good strainer for a lavatory drain. Use a dowel 1/8" less than the hole diameter. Press down so the stopper will have clearance.




Cones of perfume incense ignite as soon as a match is touched to them if the tips are coated with a drop of cellulose cement. This dries and forms an inflammable coat that ignites the incense.



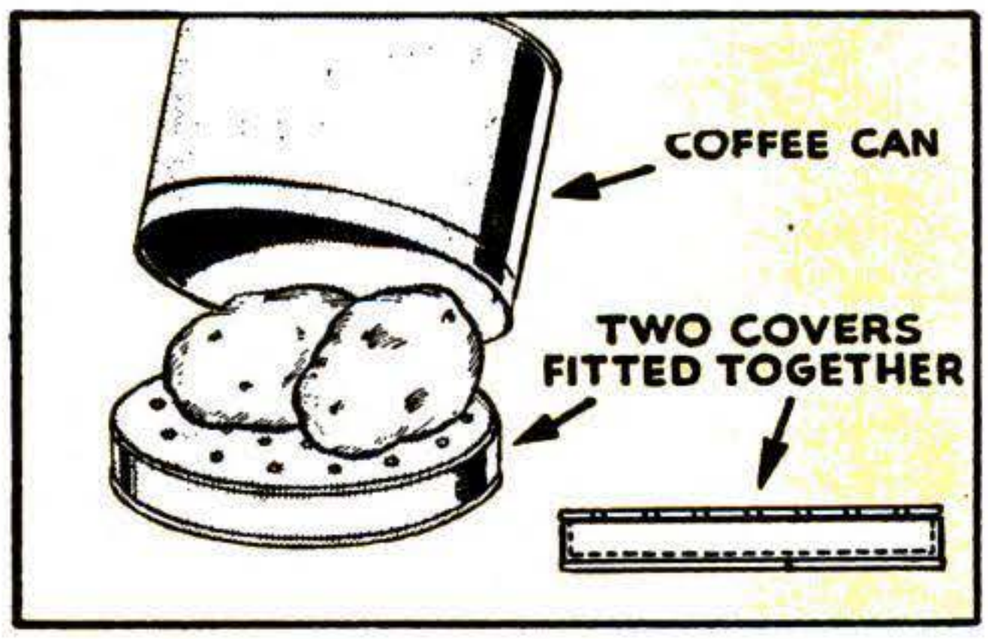

Milk often soaks into tiny cracks in the cork of a thermos bottle. Because this milk is difficult to remove, it spoils, causing an offensive odor. This annoyance can be ended with a rubber stopper.



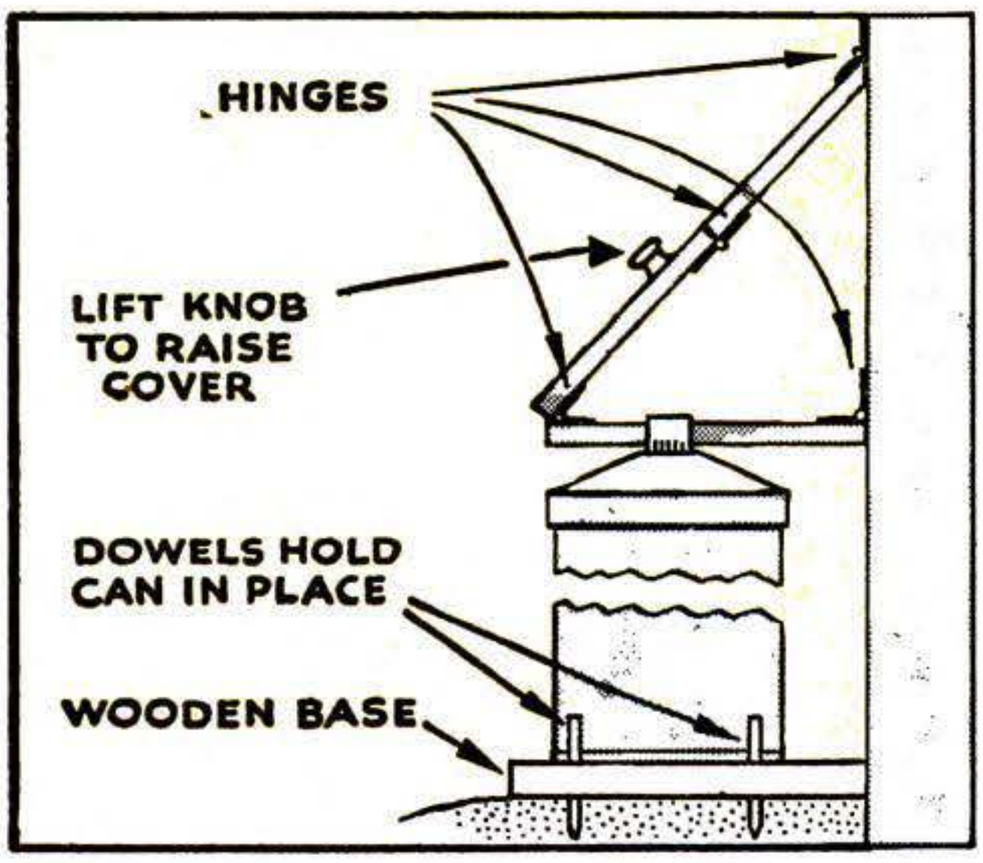



Copyrighted material

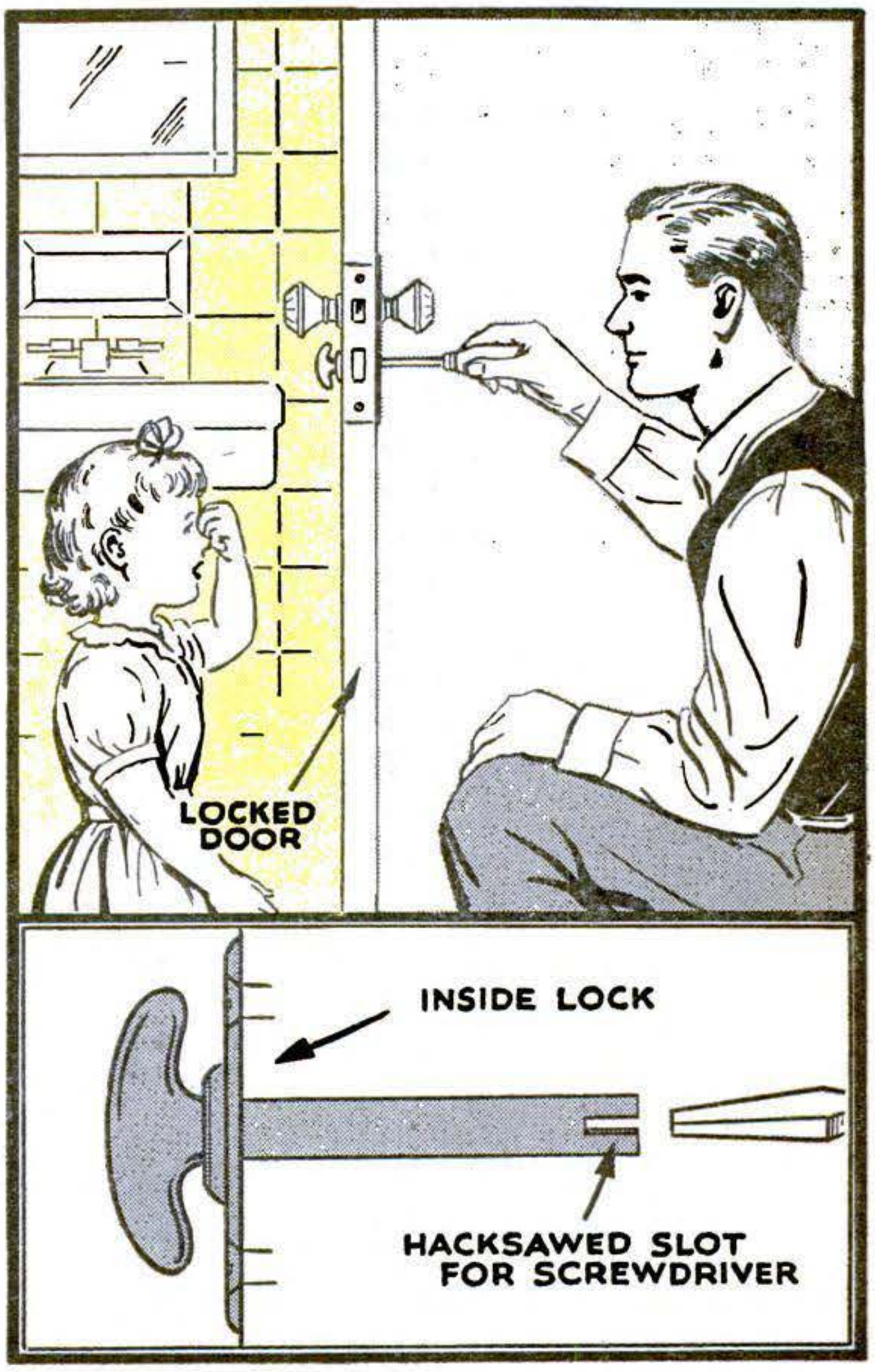
# THE HOME SHIPSHAPE




You can make this stove-top baker and hot-plate from a coffee can and two lids. Try to find a lid that will fit snugly inside the can lid. Then punch holes in this one, which faces up.

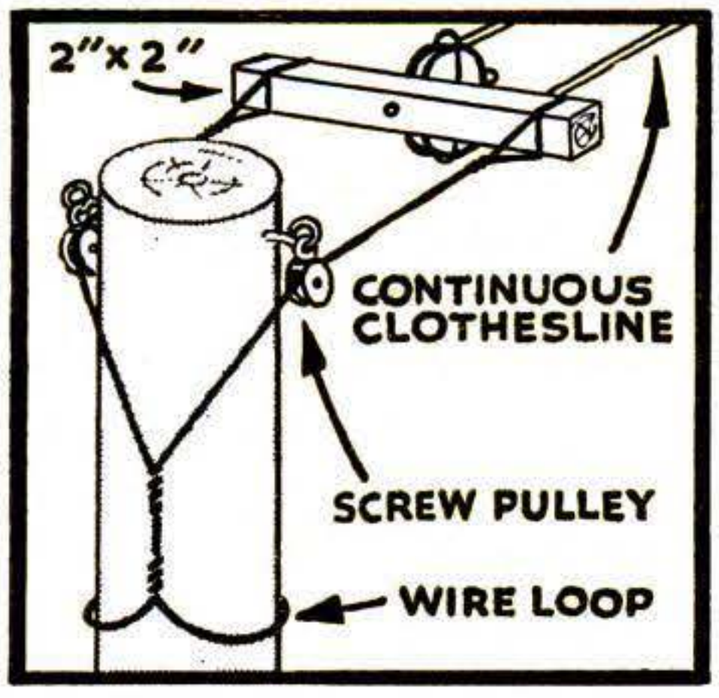



Dogs cannot upset this garbage can or nose off its cover. In addition, the cover automatically returns to place when released. Heavy dowels or pipes serve to locate the can on its base.

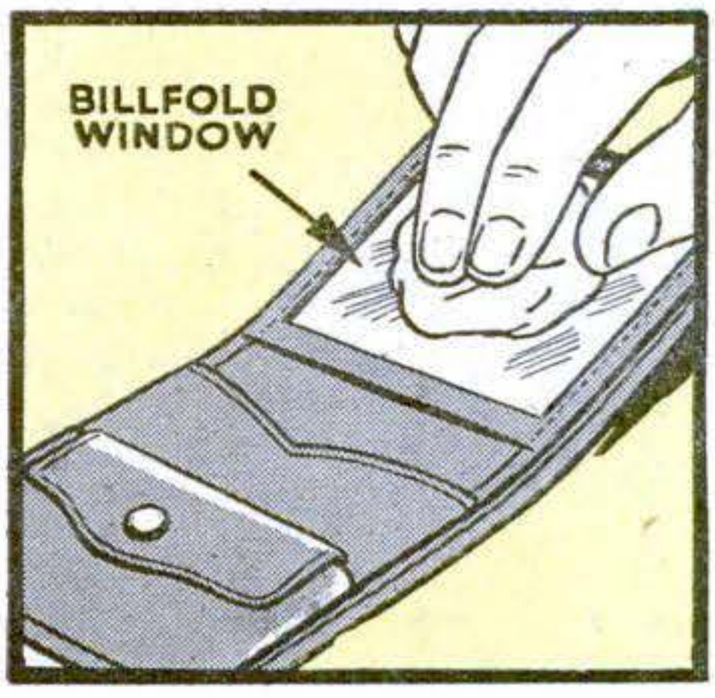



Newspapers frequently tell of firemen climbing through bathroom windows to reach children locked inside. If your bath has the type of inside lock shown here, it can be altered as indicated for opening from outside.

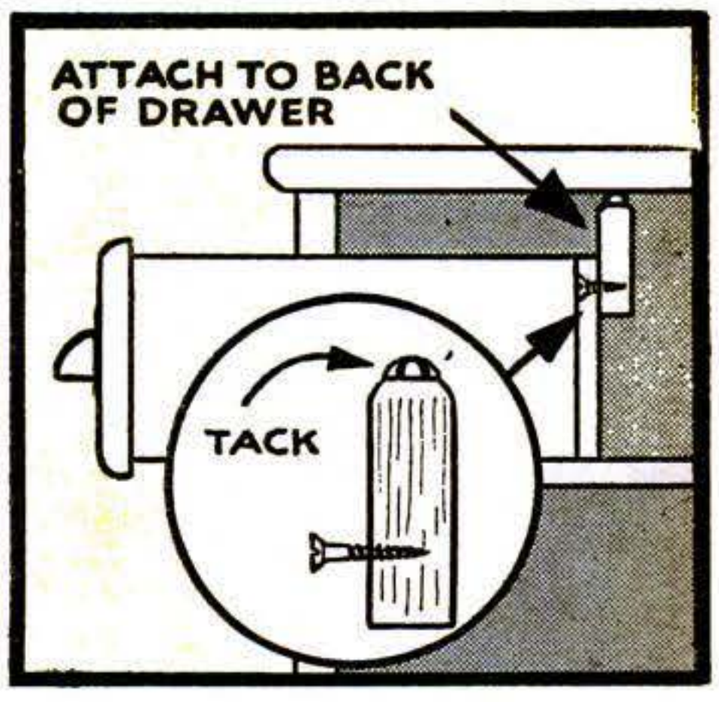
Wire loops around a post have a powerful snubbing effect. Put to use as indicated, this makes it possible to tighten a clothesline with one downward pull. The idea also is usable on a plain line.




Transparent windows of billfolds often become frosty-looking after long use. Jeweler's rouge applied to the surface and polished with a soft cloth will bring back the original transparent appearance.




Small wooden blocks attached as illustrated below will prevent the drawers of kitchen cabinets from sagging when pulled out. A smooth-headed tack on the tip of the block makes it slide easily.






Copyrighted material

# Topsy-Turvy TURTLE SUN DIAL

By JOHN A. McKINVEN

RECLINING in a garden clearing, or near a rocky pond, Mr. Turtle obligingly lets the hours sweep across him while his tail casts a shadow that tells you the time.

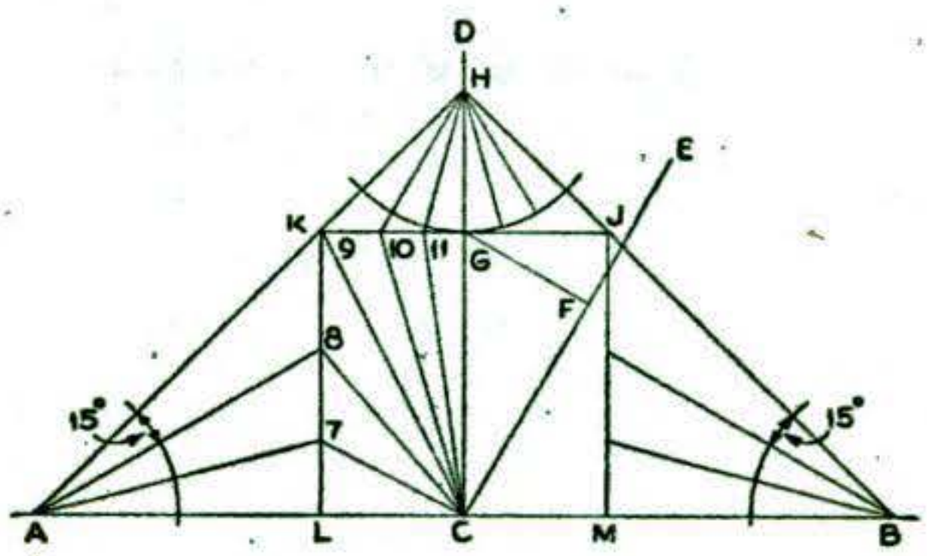
His body is built of three pieces of ¾" stock, shaped in the form of two equal circles with centers 1" apart. With the largest one on top, the radius of each succeeding lamination is reduced ½". The layers are fastened together with nails and waterproof glue.

Any nonrusting metal can be used for the dial—aluminum, lead, brass, dural, copper, and so on. It is laid out in the same manner as the body but with 3" radiuses, and the feet added to the outline. Hour lines are scribed on the metal from a paper pattern plotted for your latitude.

The turtle's tail acts as the index or gnomon of this sun dial; it is cut from metal at least ⅛" thick, and mounted on the base with wood screws. To cast a proper shadow, it must have an angle equal to your latitude, which you can determine from a good map

## How to Lay Out Hour Lines

1. Draw the line **AB** and erect a perpendicular **CD**.
2. At **C**, draw **CE** so that the angle **DCE** equals your latitude.
3. Anywhere along **CE**, draw perpendicular **FG**.
4. Measure **GH** equal to **FG**.
5. Make **CB** and **CA** equal to **CH** and draw **AH** and **HB**.
6. At **G**, draw **KJ** perpendicular to **CD**.
7. Drop **KL** and **JM** perpendicular to **AB**.
8. At **H**, **A**, and **B**, draw arcs with radius **HG**.
9. Divide these arcs into 15-deg. segments, and extend radiuses until they intersect the sides of the square **KJML**.
10. The lines drawn from **C** to these intersections are the hour lines for your latitude. Thus, **CG** is the 12-o'clock line, **LC** is 6 A.M.; **CM** is 6 P.M.; **CK** is 9 A.M. Afternoon hours are omitted from the diagram for clarity.
11. On the turtle sun dial, trace these lines with **C** at the rear edge of the dial, and the 12-o'clock line coinciding with the center line of the turtle. Leave room at the edge for numbering the hours. The 6-o'clock line need not be included.




## DIVE-BOMBER

THE crowing cock and the simple arrow have been telling the direction of the wind for so many years that they have fallen behind the times; on a modern home, they seem a little out of place. But weather vanes can be as timely as a flight of planes, as witness the photo at the right.

This formation of dive bombers is made of sheet metal. Enlarge the pattern and trace it onto the metal. Cut at least the three leading planes out of one piece for greatest strength, using inside and outside tin snips. Where it is necessary to join two pieces, use a soldered patch.

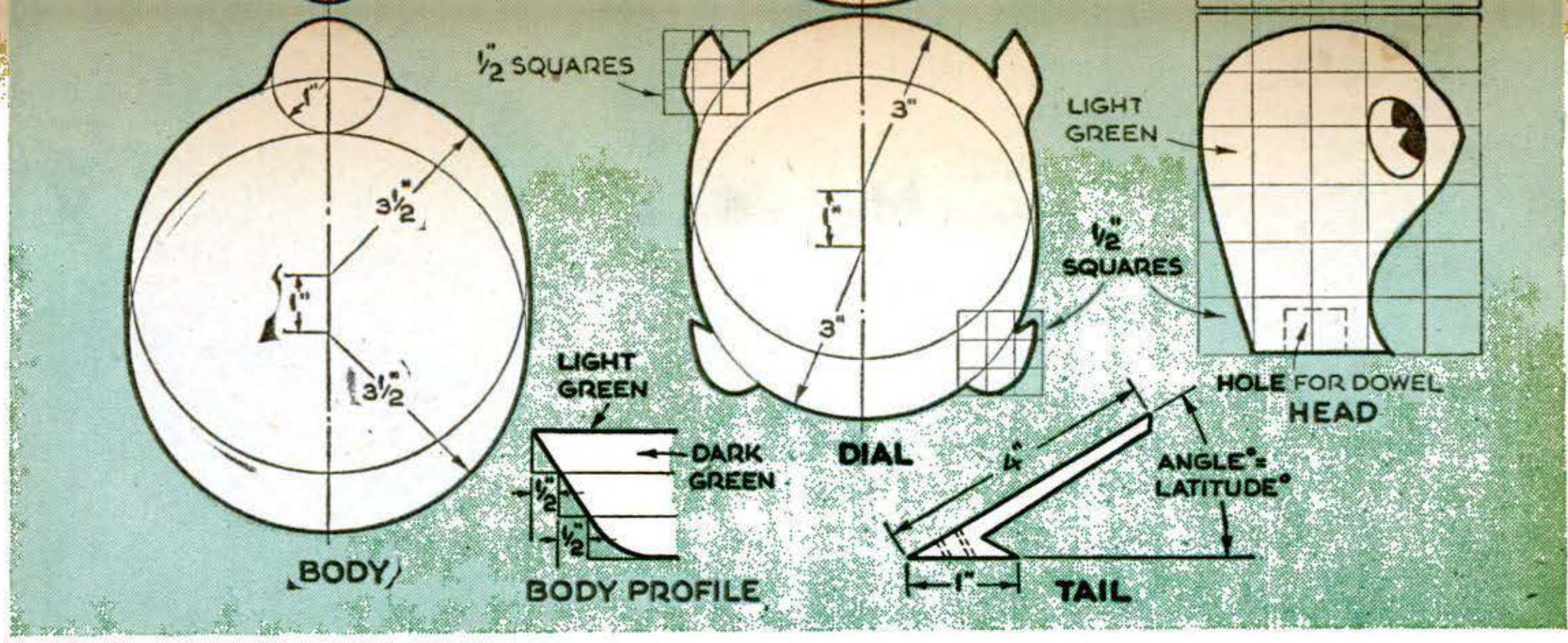
To make the slots that represent the wings, drill a hole at either end and chisel out the remaining stock, using the end of a hardwood block as an anvil.

The two points where the planes meet in head-to-tail formation are joined by means of split rivets as shown in detail *A*. Drive a screw into the upper end of the brass-tube bearing to keep out rain.

It is necessary to add a counterweight to the fuselage of the leading plane in order to obtain a free-swinging balance. Determine the necessary weight by trial. A coat of black outdoor enamel finishes the silhouette.—GEORGE E. HARRINGTON.



Copyrighted material



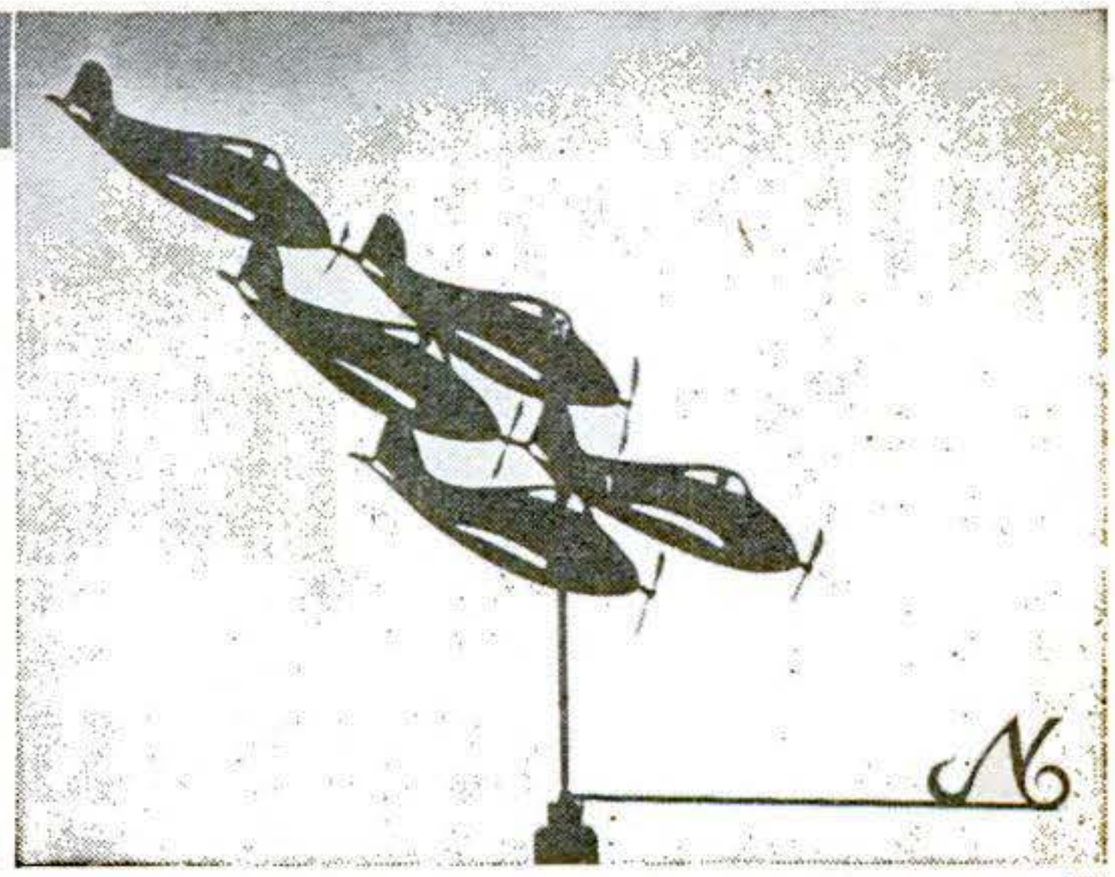

or from the office of any local surveyor.

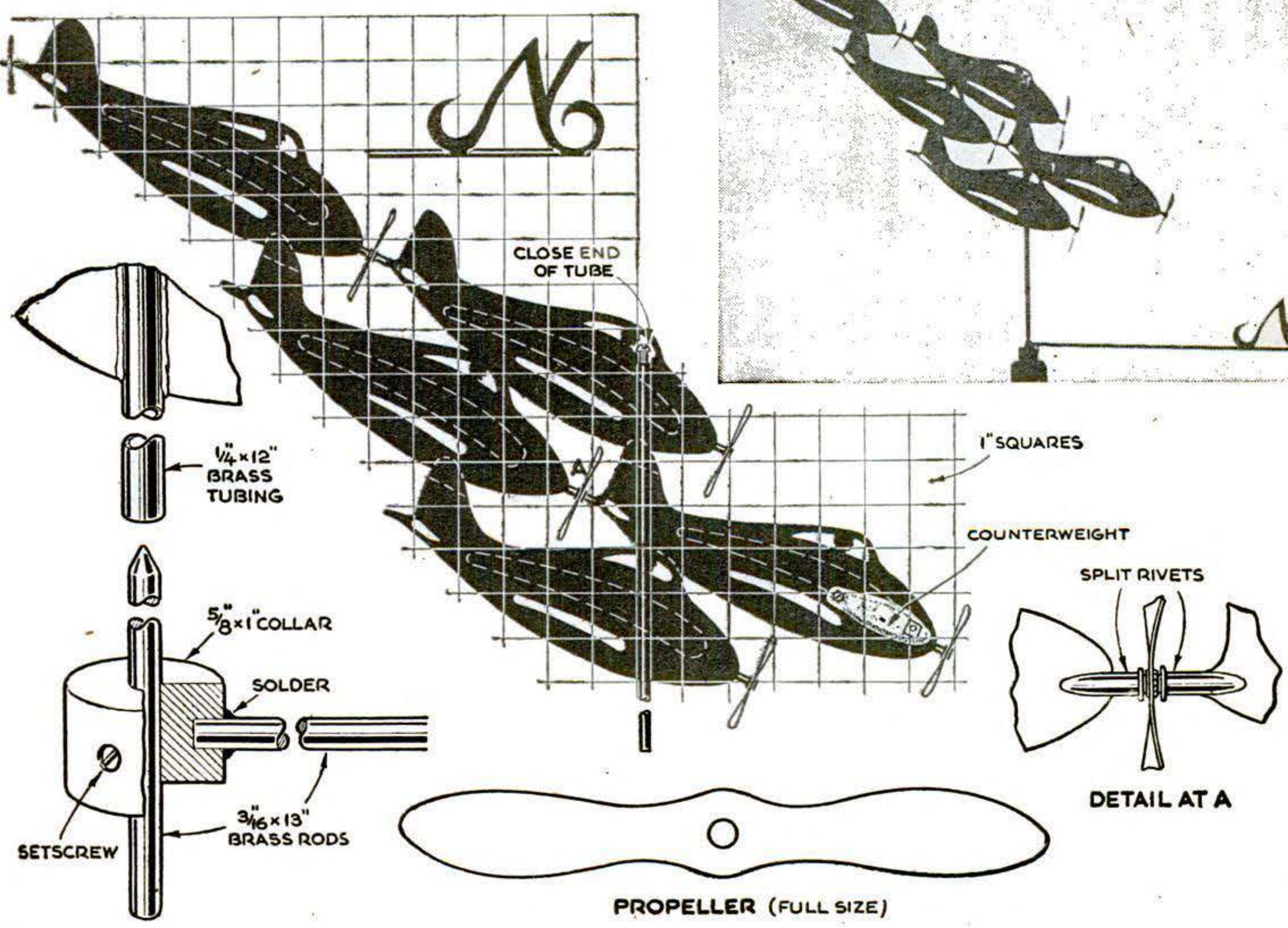
Make the head of ¾" wood or thicker, and attach it to the body with a dowel. When the dial is inscribed, center it on the body and fasten it with four roundhead brass screws. The tail is attached at the vertex of the hour lines; it must be perfectly vertical and parallel to the 12-o'clock line.

Two precautions are necessary when setting the finished sun dial in place. The dial plate must be level; adjust it with a good carpenter's level. Also, the 12-o'clock line must coincide with the true north-south line. When properly aligned, the gnomon points to the North Star.

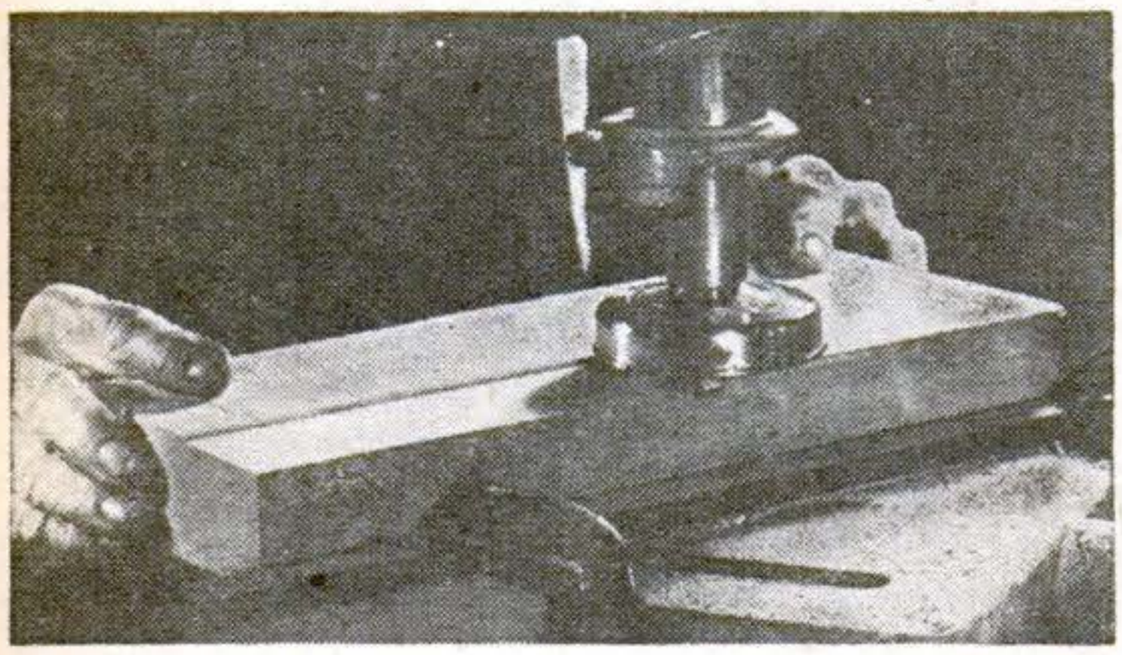
The time registered by any sun dial is local apparent time, and may run as much as 16 minutes ahead or behind your watch during a year. In addition, the dial will be one hour ahead of daylight-saving time.

## WEATHER VANE

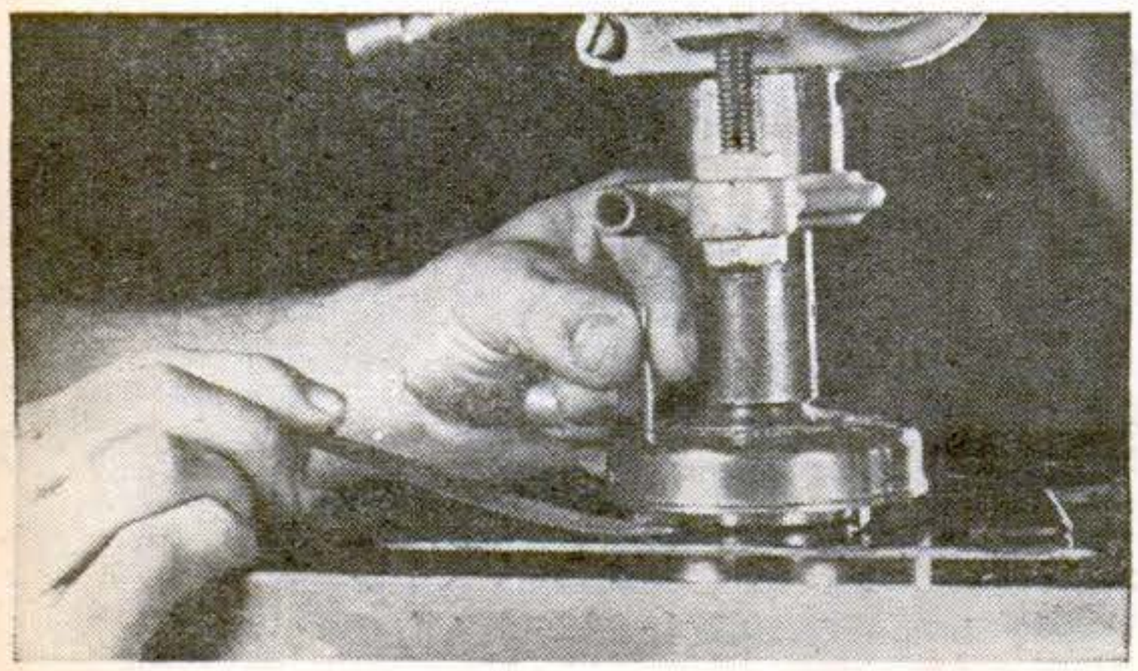


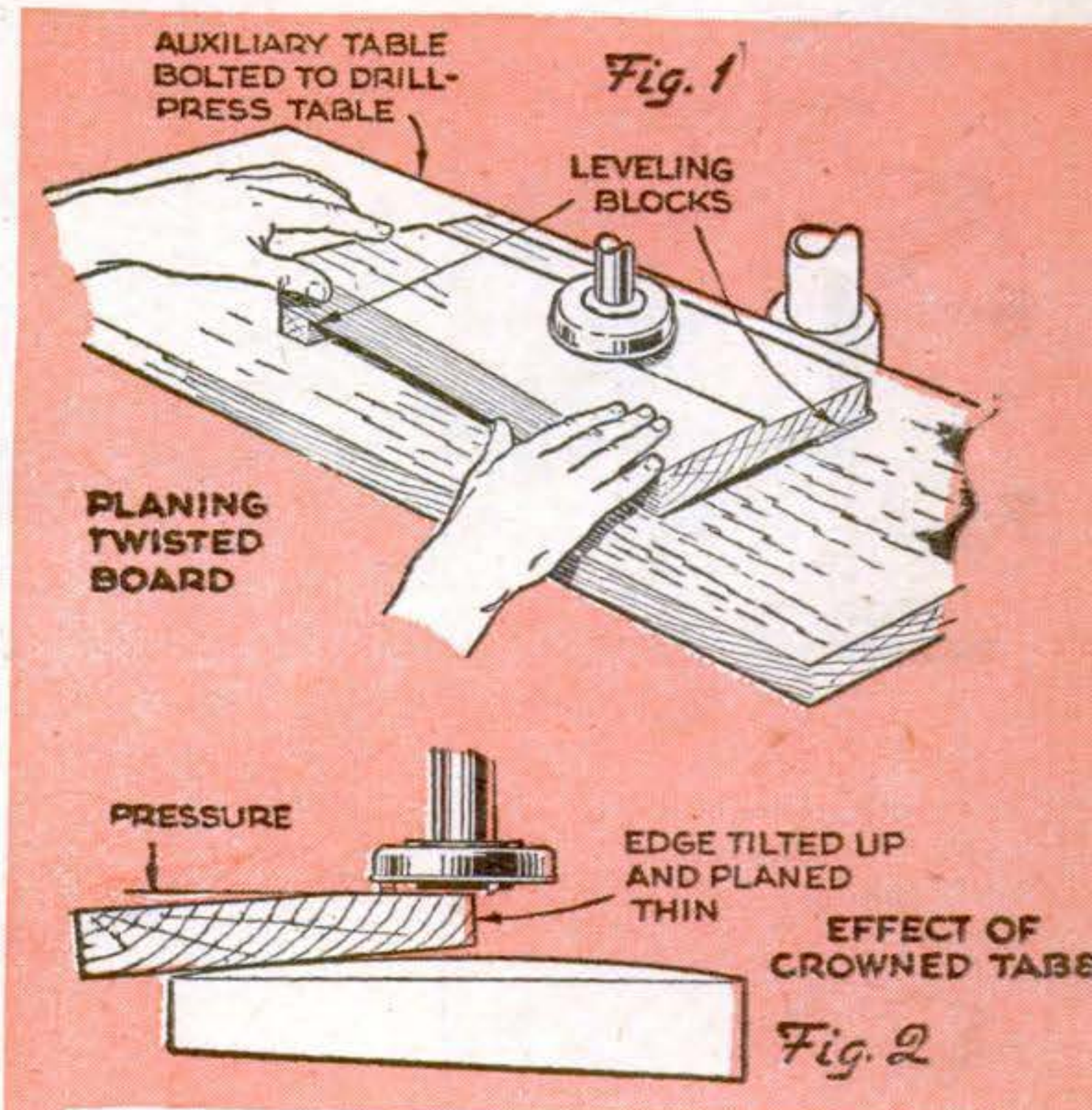


Raising a panel with curved sides. A fence cut to the same curve guides the work. For a curved raised edge on a straight-sided panel, use the same setup after tacking a curved guide to the edge of the work.



For planing, a fence is clamped diagonally across the table and is swiveled back for each new cut. When the center of the board is reached, the work is turned end for end for planing the other half.






At left, setting the knives by pressing them down on a brass feeler gauge on top of the thickness gauge. The quill is locked during this operation. One knife is set at a time.



Copyrighted material

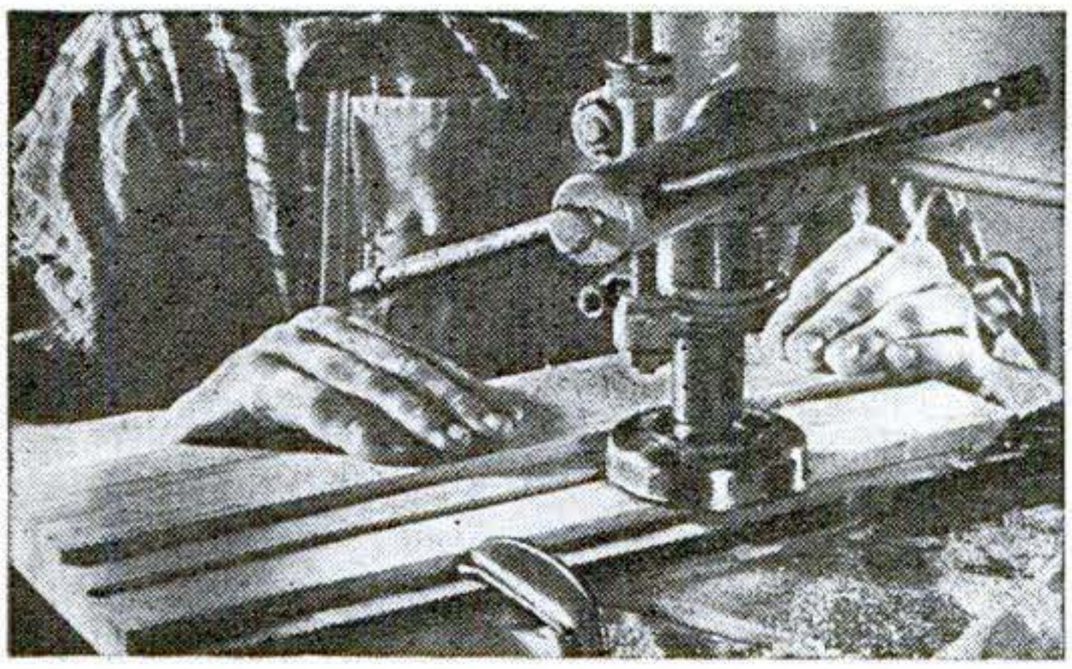
# The Drill Press as a Planer

By EDWIN M. LOVE

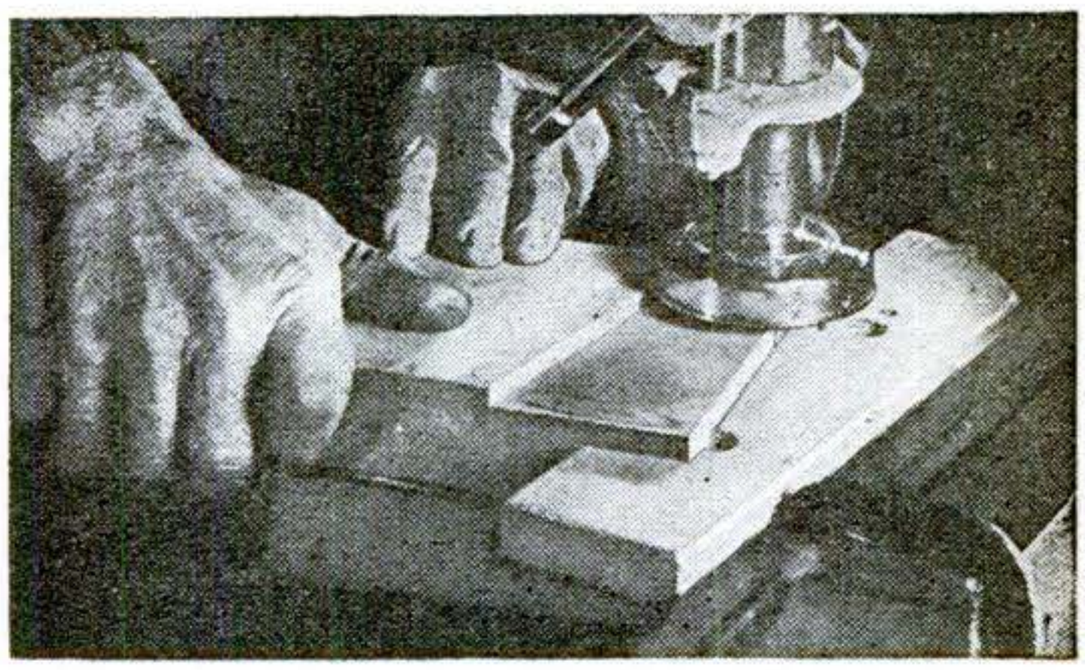
HOME craftsmen who have a drill press will find a rotary planer offers a speedy, accurate method of surfacing wide boards. The attachment is inserted in some drill-press chucks in the same way as an ordinary drill or router bit. Special adapters are available for use with taper-shank chucks.

The tool can be used on boards up to 12" or 14" wide. Stock being surfaced passes between the cutters and the table and is straightened and brought to uniform thickness. Not only does the planer eliminate the need for hand tools in surfacing, but it also can be used for rabbeting and its variations, panel raising, tenoning, and wide grooving and routing.

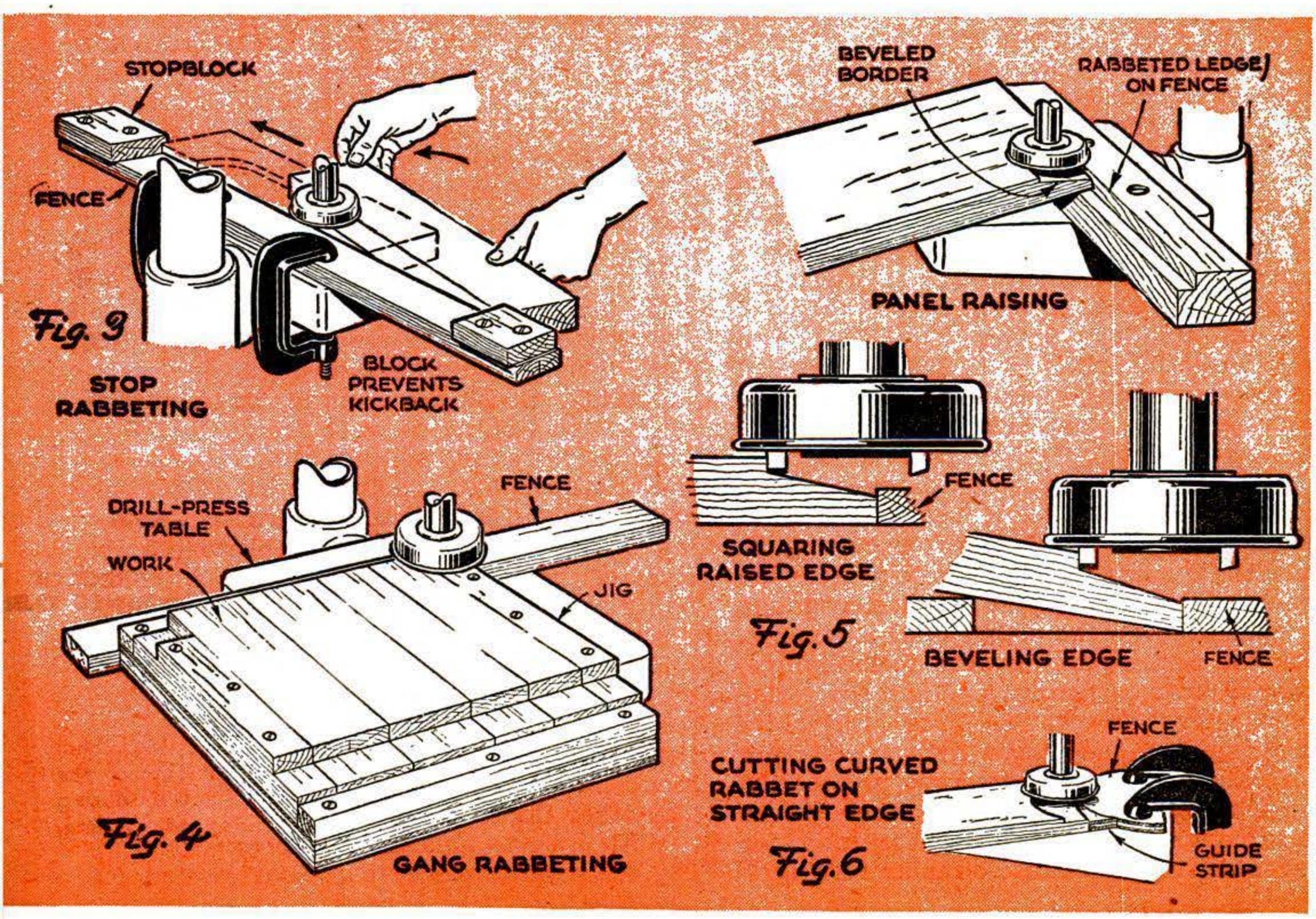
Set the drill-press table level and clamp a wood fence ¼" thick on it diagonally from the far left corner to near the front right. Belt the machine for its highest speed (up to 5,000 r.p.m.) and lower the planer to take the required cut. Rest the



Rabbeting is like taking the first cut in planing. In double rabbeting, make the wider rabbet first.

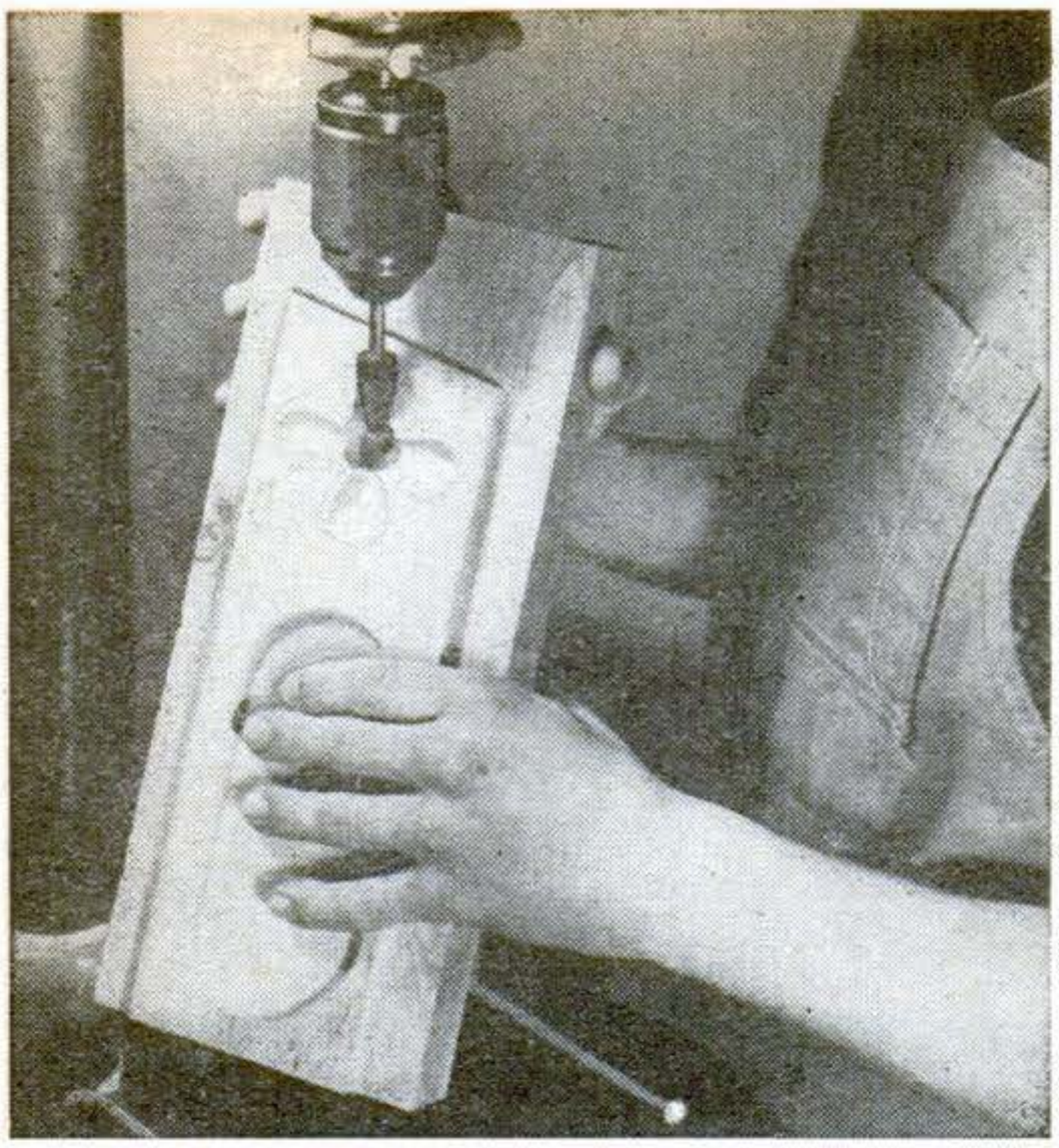


Taper rabbeting in a notched guide. Turn over the guide and work to cut the other side of a tenon.

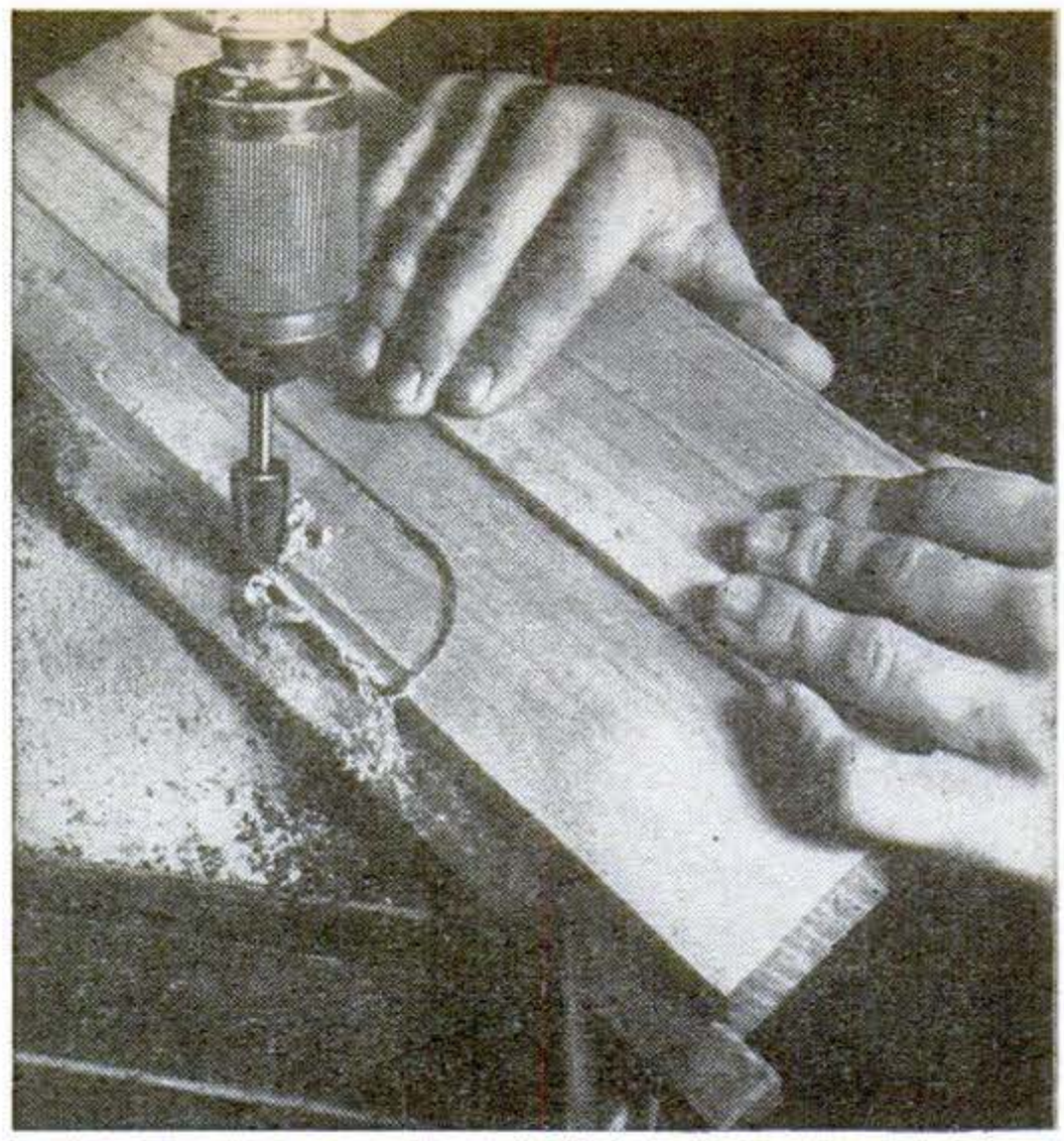





Copyrighted material



Rotary files used in a drill press speed carving operations. Most such work is best done freehand with the piece held firmly and fed in lightly so the tool won't grab and pull it toward the chuck.



Working a cove with a rotary file. In this case, different parts of the file are brought to bear by tilting the table. The profile of the cut is further varied by changing the angle of the fence.

board on the table, press the edge against the fence, feed from the left with the left hand, and hold the board down with the right. Don't rock or lift the work, or it will be gouged. Take care, too, to keep the fingers away from the whirling cutters.

When one pass has been made, loosen the right end of the fence, swing it back, clamp it, and take another cut. This is continued to the middle of the board; then the piece is turned around and the process repeated.

Obviously the board will not be planed true unless the underside is flat. It is well, therefore, to plane the sides alternately so truly flat surfaces will slide on the table.

A board in wind (twisted) may be set up on blocks tacked under one or more high corners, as in Fig. 1, to make four contacts with an auxiliary table. Then the high points are trimmed off with the planer until one side is smooth, after which the board is turned and the other side planed. A fence can be used, but freehand planing is easy.

In setting the knives for planing, use a strip of brass or other soft metal for a feeler gauge, filing off the burr after cutting it. Place the thickness gauge provided with the planer on the table, rest the feeler gauge on top, and lower the planer until it touches. Lock the quill, withdraw the feeler gauge, loosen a cutter setscrew, and slip the feeler gauge under one knife. Press the knife gently against the gauge with a pin from above and tighten the setscrew. Rotate the planer backward and set the other knives the same way. Do the setting carefully, for uneven setting will cause circular scoring.

If the table is high on one side, there will be semicircular scoring on the high side. This can often be remedied by loosening the clamping bolt slightly, withdrawing the positioning pin a little, and striking the high edge with the hand. Tighten the nut and test again on waste wood.

Thin edges on planed boards indicate the center of the drill-press table is crowned (Fig. 2). Slight crown can be ground down with emery cloth on a block. A less permanent cure is to apply a coat of paint and sand off the center when it has dried.

Burning is caused by dull cutters. It can also be caused by feeding too slowly.

Rabbeting is similar to taking the first cut in planing, except that the fence is carefully placed for gauging the width of the rabbet and the planer is set to required depth. Special long cutters are available for deep rabbeting. Check the accuracy of the setup by rabbeting on waste wood first.

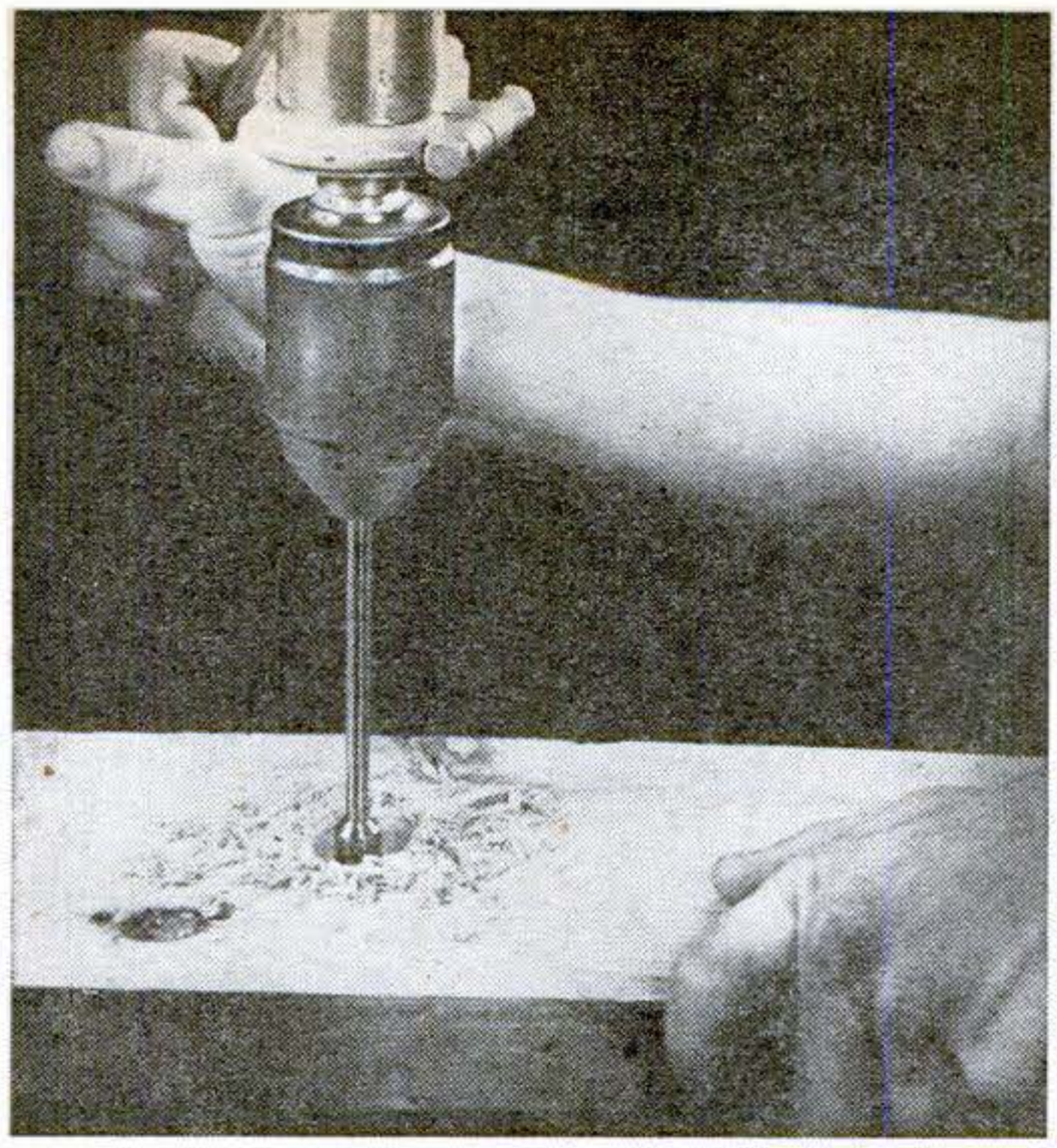
Taper rabbeting is done with the edge of the board set into a notched strip, which is slid along the fence with the work. Tenoning is simply a process of rabbeting both sides of the end of a rail. If tenons are to be off center, cut one side of all pieces, reset the planer, and rabbet the other sides.

Stop rabbeting is handled as on a shaper by screwing or clamping two blocks to the fence, as shown in Fig. 3. One block locates the starting end of the rabbet and prevents kickback as the work is fed into the blades. The other limits the length.

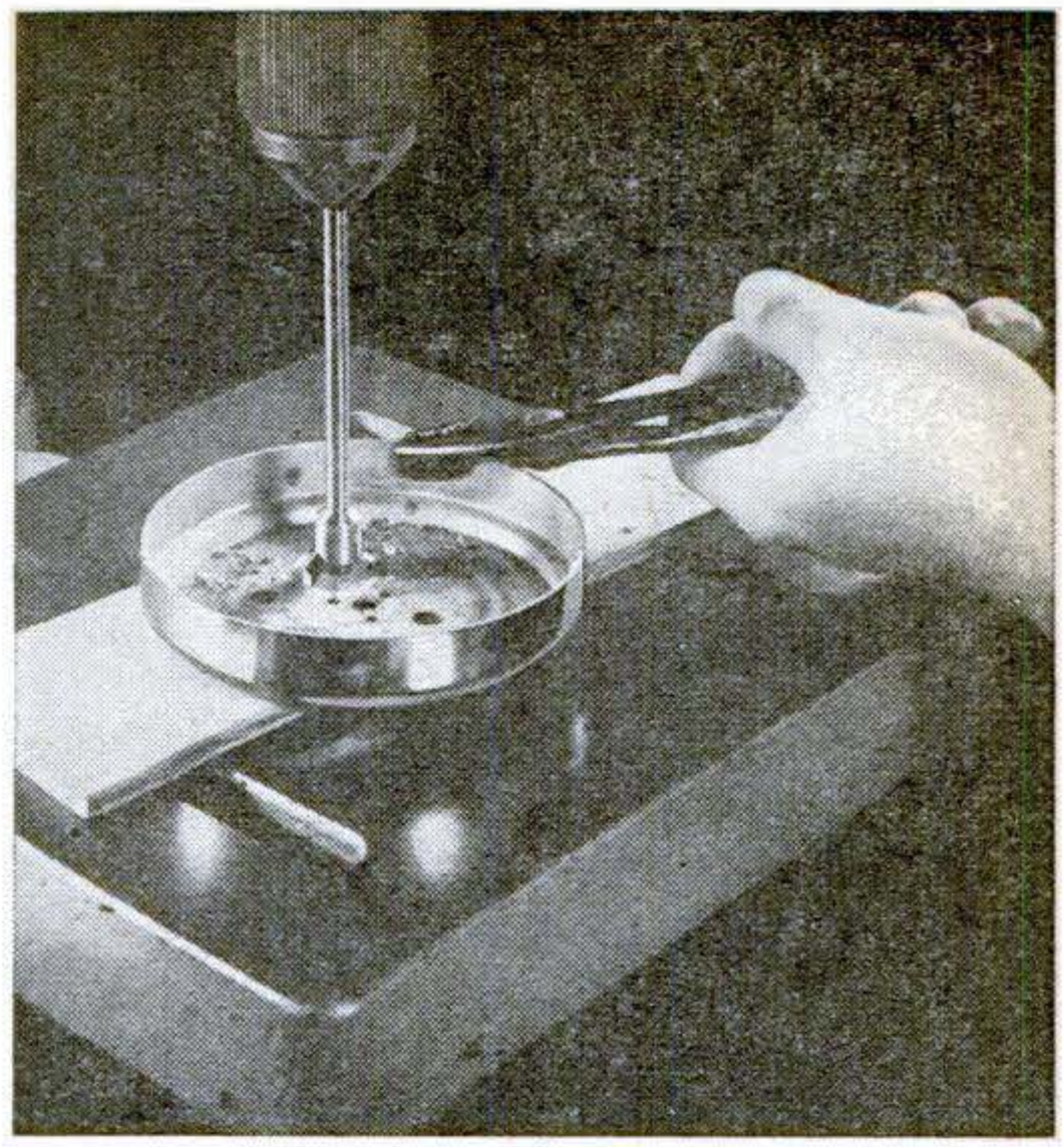
With a jig to hold them in position, as in Fig. 4, several pieces can be rabbeted or



Copyrighted material



Hole cutters for use in a drill-press chuck are similar to an expansive bit. They are adjustable to any size hole, as indicated in the drawing below, and they will bore cleanly into the wood.



Besides boring wood, a hole cutter is useful also on plastic and thin metal, working these with the same rapidity and cleanness. When metal is being cut, the drill press should be run at low speed.

tenoned in one pass. When one end of the gang has been rabbeted, turn the jig end for end and rabbet the other end.

Panels are raised by rabbeting all around, cutting the ends first or starting with an end and continuing around the piece. For a beveled border, lift the edge on a rabbeted fence (Fig. 5). To square the inclined edge of the raised section, lay the panel flat and trim with the cutters; to incline it backwards, clamp a strip under the opposite end. Curved raised edges on straight-edged panels can be made, as in Fig. 6, with a fence cut to the desired curve, but convex for concave edges and concave for those that are convex.

Rotary sanders for use in the drill press work much like the planer. A small amount of stock is left on in planing and is then removed by the sander.

Rotary files resembling oversize dental burrs (Fig. 8) are useful drill-press tools for carving and odd shaping operations. When they are used freehand for carving, the work must be held firmly so the spiral teeth won't screw it toward the chuck, and it must be fed lightly into the tool. Various portions of the file are brought to bear by tilting the drill-press table when shaping, and the profile is further varied by inclining the fence on the tilted table.

Hole cutters, which are a new type of expansion bit, are available for drill-press use. They can be set to cut any size hole, as shown in Fig. 7, and they bore rapidly and cleanly in wood, plastic, and thin metal. Use the lowest speed for metal.

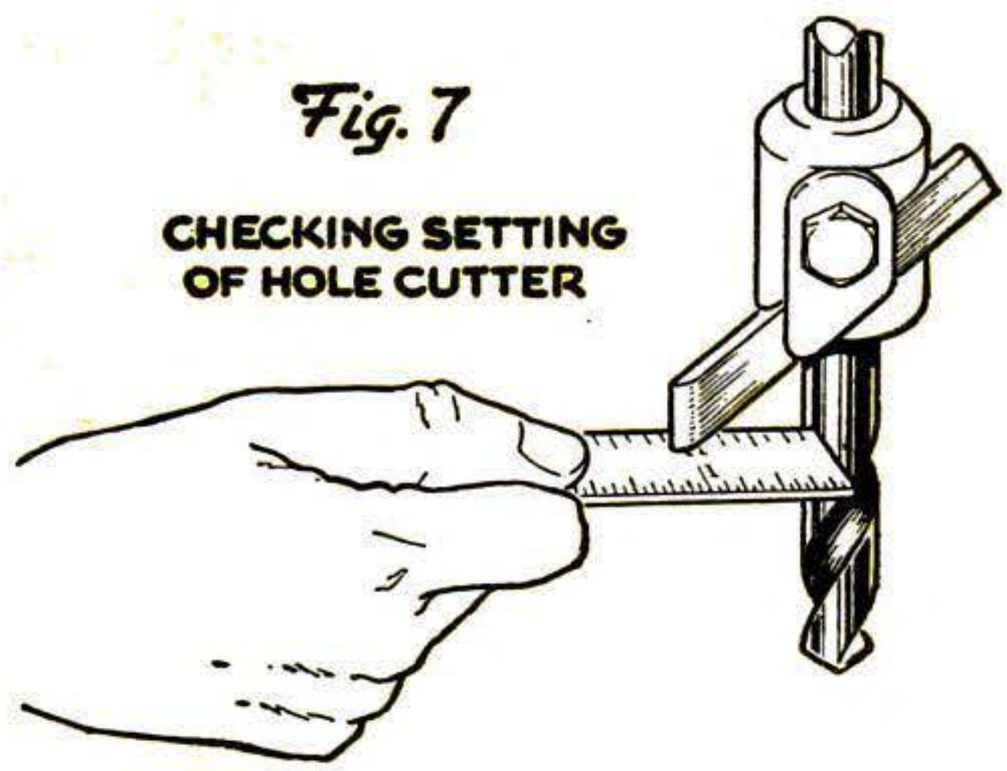
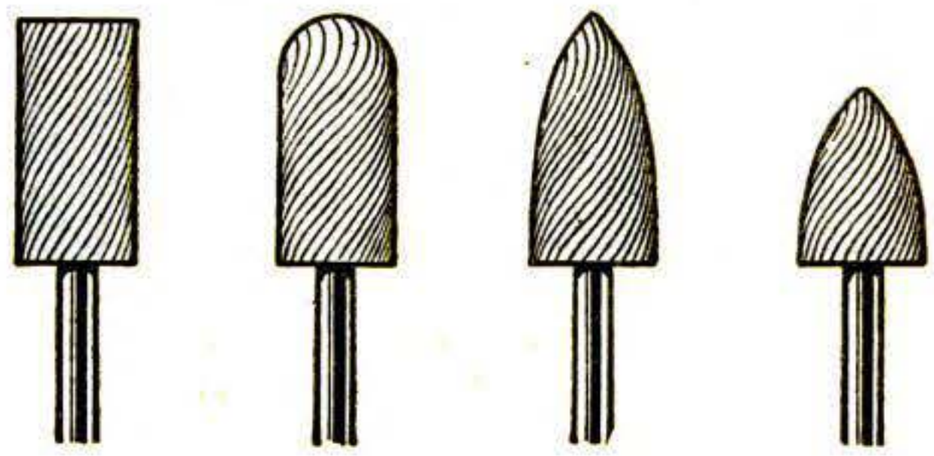


*Fig. 7* CHECKING SETTING OF HOLE CUTTER

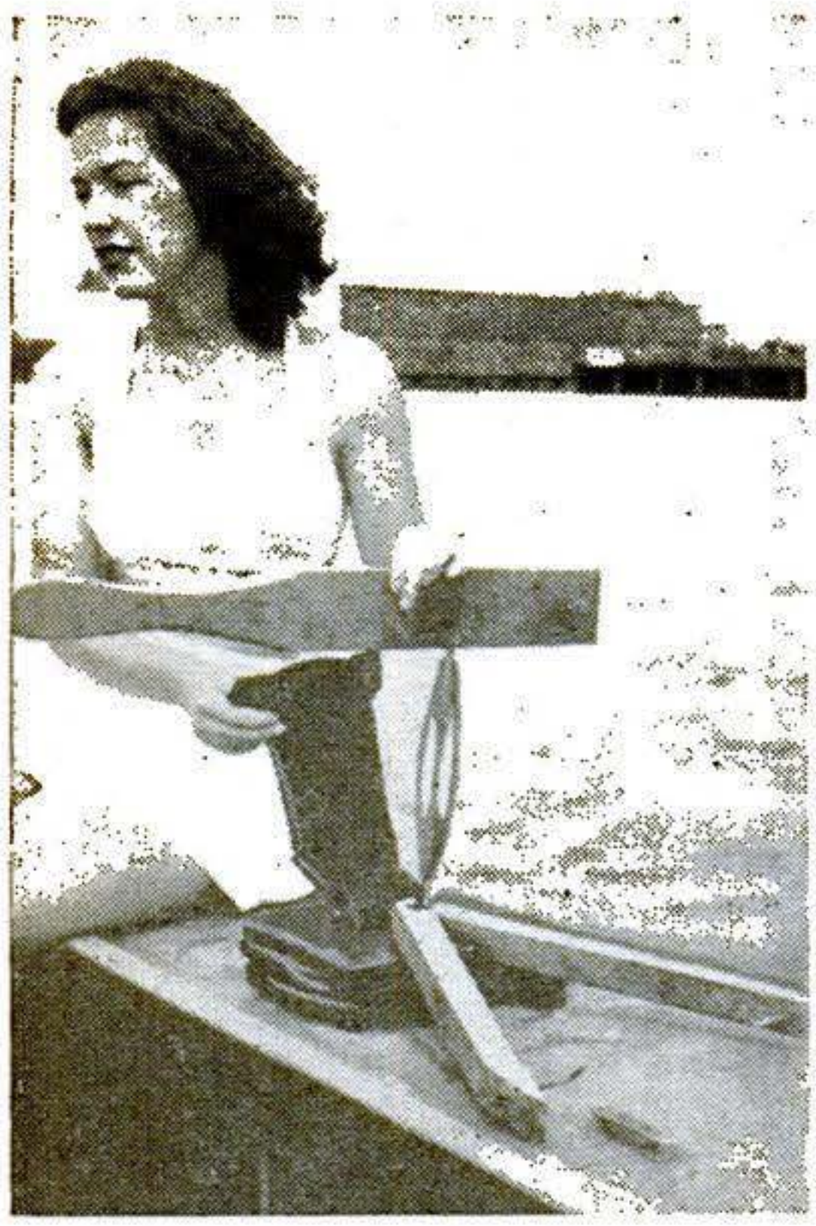
*Fig. 8* TYPICAL ROTARY-FILE SHAPES



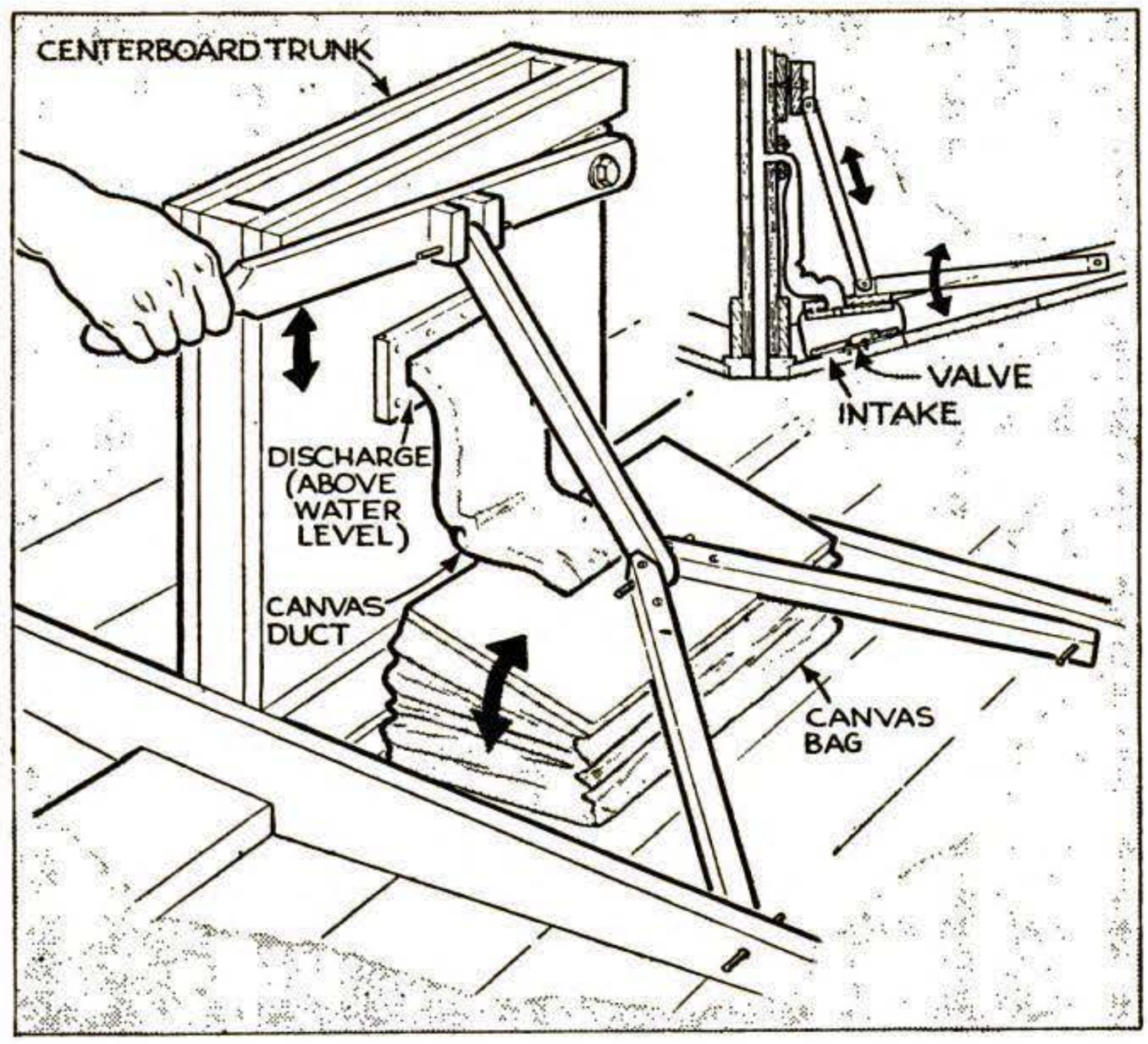


Copyrighted material

# Bilge Pump with Bellows Discharges into Centerboard Trunk



This view before installation shows the parts of an efficient bilge pump.

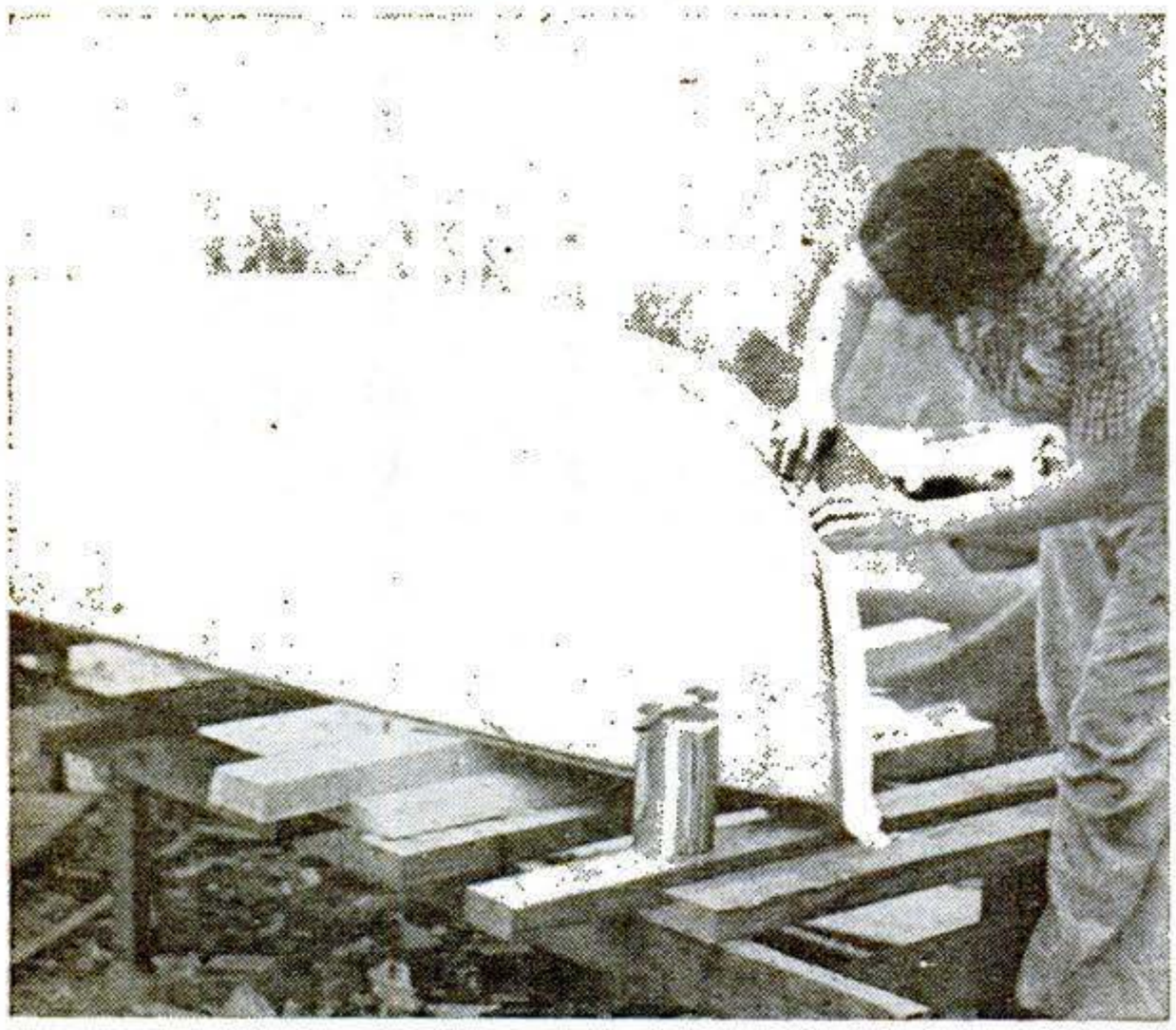



Here is how the pump works. With the intake near the keelson at the low point of the bottom, the boat is kept virtually dry.

THE bilge of a small sailboat may be easily kept dry with a homemade pump like the one shown above. Water enters the pump bellows from beneath and is discharged into the centerboard trunk.

For the bellows, make a canvas bag with folded flanges sewed inside its open ends. Tack it to a waterproof-plywood bottom piece cut U-shaped to provide an intake area. A leather flap valve closes the intake when the pump handle is pushed down. Secure the upper end of the bag between two plywood top boards with another flap valve to hold the water in the discharge duct. Two brackets screwed to the planking grip the bottom board inside the *U* and permit sliding out the unit for removal. Dimensions may suit the boat. For easy action, the pump handle should be a lever with a 3-to-1 ratio.—JAMES L. FINCH.

# Fabric Backing Strip on Re-Covered Canoe Helps Stop Leaks



When a canvas boat or canoe is being re-covered, there will be less chance of its leaking if a 3″ wide strip of light canvas or heavy muslin is first bedded over the stem in heavy paint or marine canvas cement, whichever is being used for the job. The strip should be long enough to reach back to where the V-section of the stem begins to flatten out. It provides a backing where the covering must be slit back for lapping over the stem.

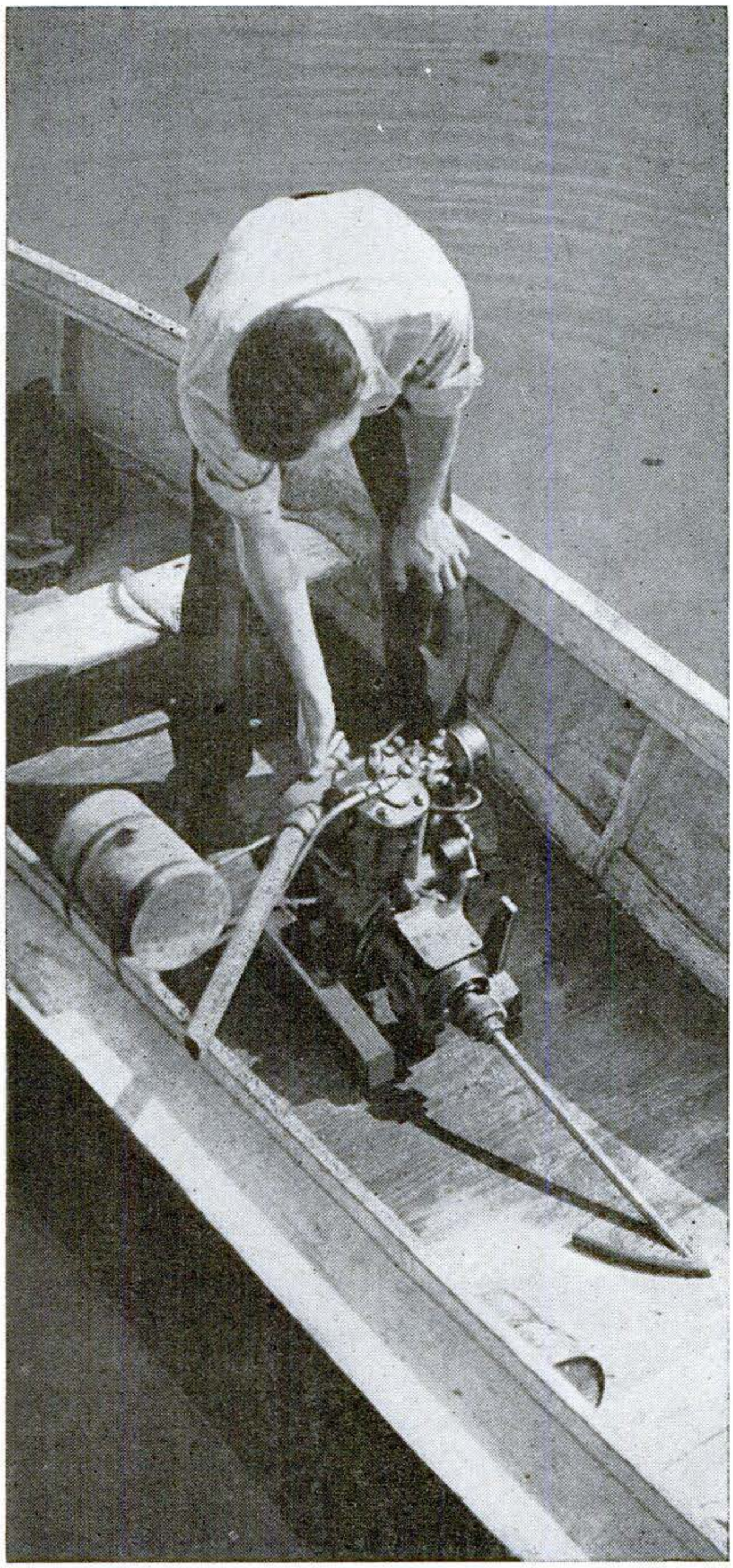
Don't use tacks to hold the covering itself except on the face of the stem where they make it secure, but bed it instead in plenty of paint or cement. When a canoe is being recovered, the stems at both ends require fabric backing.—J. A. E.



Copyrighted material

# Inboard Engines for Small Boats

## PROS AND CONS ABOUT POWER PLANTS FOR SMALL BOATS WITH HINTS ON THE INSTALLATION OF INBOARD FITTINGS



Note simple installation of this engine in a flat-bottom skiff. It takes little space and is readily accessible.

**By J. A. Emmett**

WITH a variety of small marine engines back on the market, many boat owners will be considering whether an inboard will suit their purpose better than an outboard. Some may want to put an engine in a boat they own now; others may be contemplating purchase of a new boat with engine installed.

But will such an engine be easy to start, dependable in operation, and economical to run? What speed can be expected? How about the cost? Is the boat now owned suitable to take an inboard engine, and if so, what work will be involved in installation?

Small inboards never were intended to displace the handy outboard motor entirely, and they never will. Both types have their place in the boating picture, and it is impossible to make a general statement of the merits of either. Each has its advantages and disadvantages, but much depends on contributing factors—the type and size of the boat, its construction, the purpose for which it is wanted, the waters on which it will be used, and even the place in which the boat will be kept between periods of use.

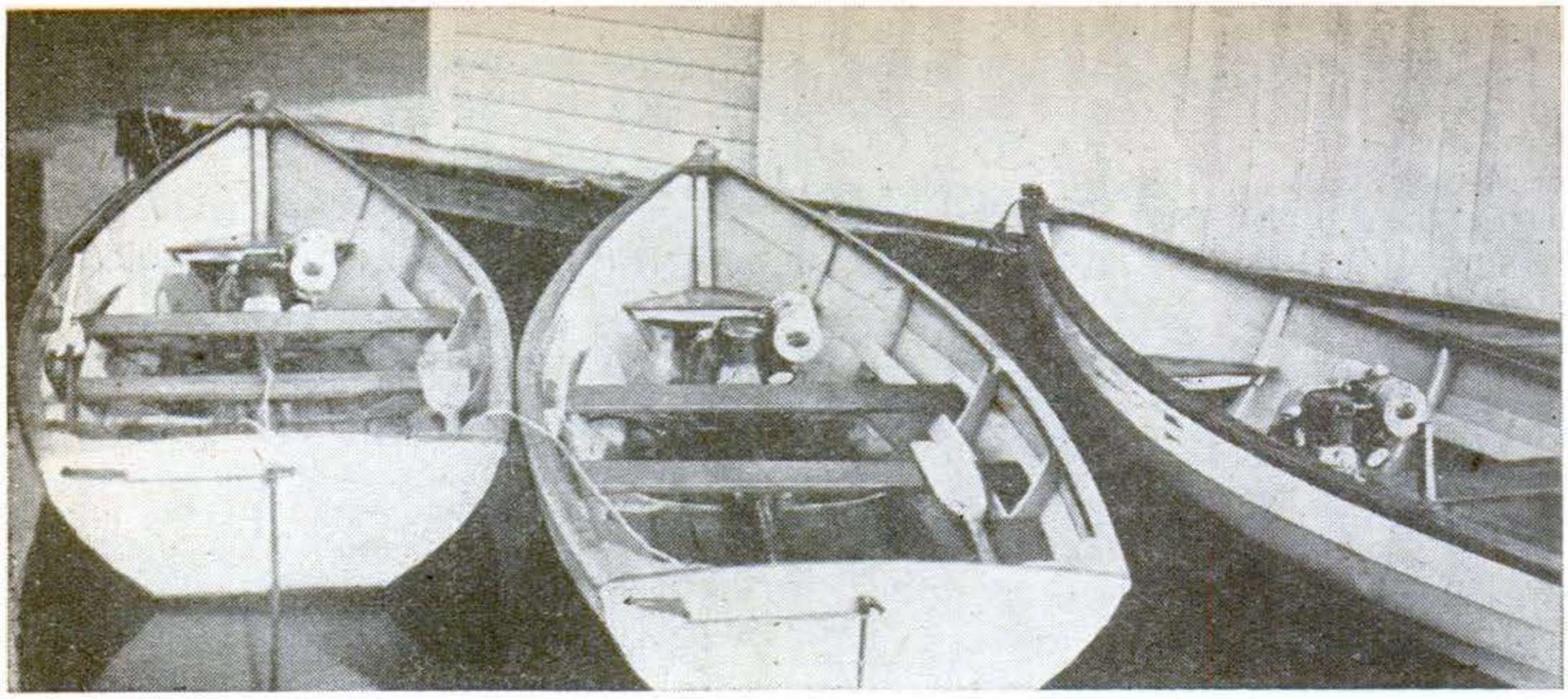
Often an outboard will be found more satisfactory for a very small boat and for speed in a fair-sized one; an inboard of up to 5 hp. may be just the thing for a larger, chunky boat and for a utility or general-purpose craft.

One of the least handy features of an inboard is its weight. Such an engine may not actually weigh much more than an outboard of comparable power but, since it can hardly be removed when the boat is handled on land, means more dead weight. Draft may be increased as much as 1′ by the propeller, projecting skeg, and rudder. While the inboard-powered boat may not require any greater depth of water in actual operation, the handy tilting feature of the outboard is lost.

Thus weight and draft can make an inboard engine unsuit-



Copyrighted material

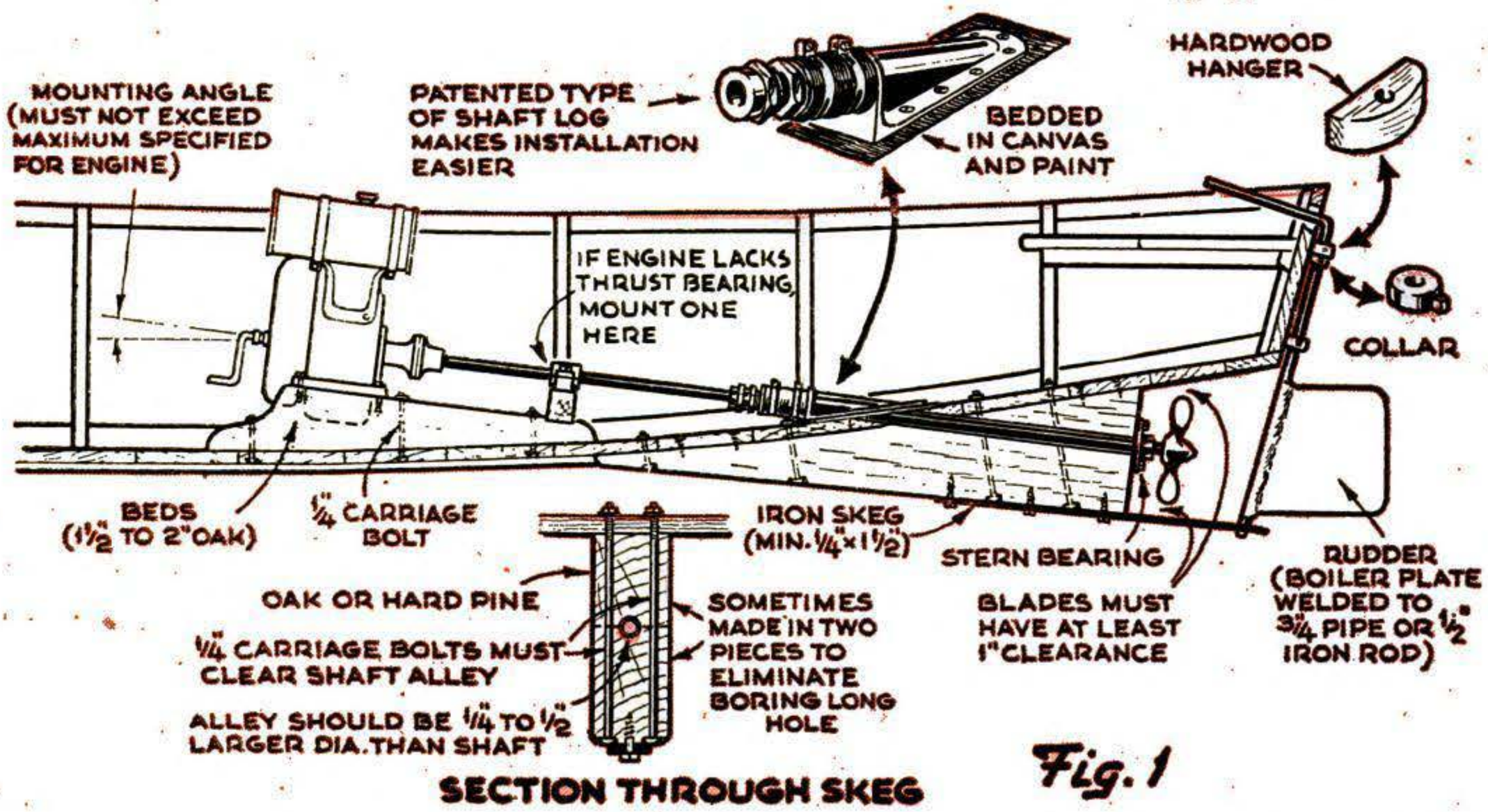


Modern inboards are compactly installed, leaving plenty of room for passengers even in boats like these.

able for such small craft as the car-top or trailer-hauled boat that is usually transported to and from near-by bodies of water and conveniently launched and taken out again. But where no shallow bars or rocks will interfere with running, no snags and floating debris are apt to be encountered, and the boat can be kept at a dock or mooring with ample water under it at all times, the inboard comes into its own. It is just the thing, too, for long runs, especially on water large enough to get rough at times.

Easy starting, dependable operation, and cheap running and maintenance can be expected if the engine is correctly installed and given ordinary care. No engine is entirely foolproof. Certain precautions must be taken and attention given even though the average inboard is not subjected to the harsh treatment of most outboards. It does not have to take the tilting, jolting, and bumping that most outboards receive in shore handling, and as a result engine adjustments, including that of the carburetor, are not apt to be disturbed.

Weight and size are not as great a disadvantage in an inboard as they are in an outboard, and heavy-duty inboards can be expected to have a long life. Such recent features as air cooling may mean less trouble from corrosion and rust, especially in salt-water service. Not having to mix oil with gasoline will be considered an advantage by many. Fuel consumption is economical, thanks largely to four-cycle operation. And for the same reason starting is normally






Copyrighted material

a great deal easier and is more dependable.

Though small inboards are generally designed to turn up a high speed, they are not intended to drive boats fast, and it is often necessary to step down speed through a reduction gear. Or it may be wise to choose a slower-turning engine to permit operation of a propeller large enough to drive a chunky boat efficiently.

About 7 to 9 m.p.h. is enough to expect of hulls suitable for powering by inboards. To attain this speed, a 10′ boat may require a ¾-hp. inboard, an average 14′ skiff one of 2 hp., and on up to say 5 hp. for a 20′ craft. Engines of these sizes weigh from 50 to 200 lb., and the prices uninstalled are from $75 to $200. Added to the initial price, however, must be the cost of fittings. Unlike the outboard, which comes complete, an inboard will need a number of extras, principally a drive shaft, coupling, propeller, stuffing box, and outside bearing or strut. Then the engine must be mounted on beds, a rudder fitted, and perhaps some means provided for protecting the propeller from damage.

For most models the fuel tank must be installed up in the bow or beneath a seat with gravity flow to the carburetor. Air-cooled engines usually have the exhaust fitted with a muffler. You may want, or in the case of a water-cooled model have to, lead the exhaust through the side of the boat or the transom. Water-cooled engines also must have a cooling water supply from a simple through-the-hull fitting in the bottom of the boat and a discharge through the side or into the exhaust line. Incidentally, aside from cost, an air-cooled engine is easier to install and does not require draining in freezing weather. Good ventilation is necessary, but in an open boat any box protection may have the ends open or be folding or demountable.

But back to cost—even if you make the installation yourself, you can see that you must add a number of extras in your estimate. It may be a good idea to compare your figures with the prices asked for several makes of general or utility runabouts complete with engine installed. Most ready-made jobs include a reverse gear or clutch for easier starting. With it, the engine can be warmed up in neutral at the dock and shifted into forward speed, or a boat may even be stopped or handled in reverse. This is much more convenient than the straight-ahead starting of outboards and may be well worth considering whether you install your engine yourself or buy the complete outfit, even though it may add $50 to the cost.

Type of hull must be considered first if you intend to install an inboard in your present boat. In general an inboard cannot be installed satisfactorily in a hull meant for outboard power—it is a matter of basic design, since the true outboard runabout necessarily has its point of greatest bearing aft, not forward where it is needed for inboard power. This should rule out the inboard for all rather fast outboard-runabout types, but there are many others in which an inboard will work satisfactorily. Boats intended primarily for rowing or for small outboards are good. They have conservative hulls with good bearing amidships and not too much fullness

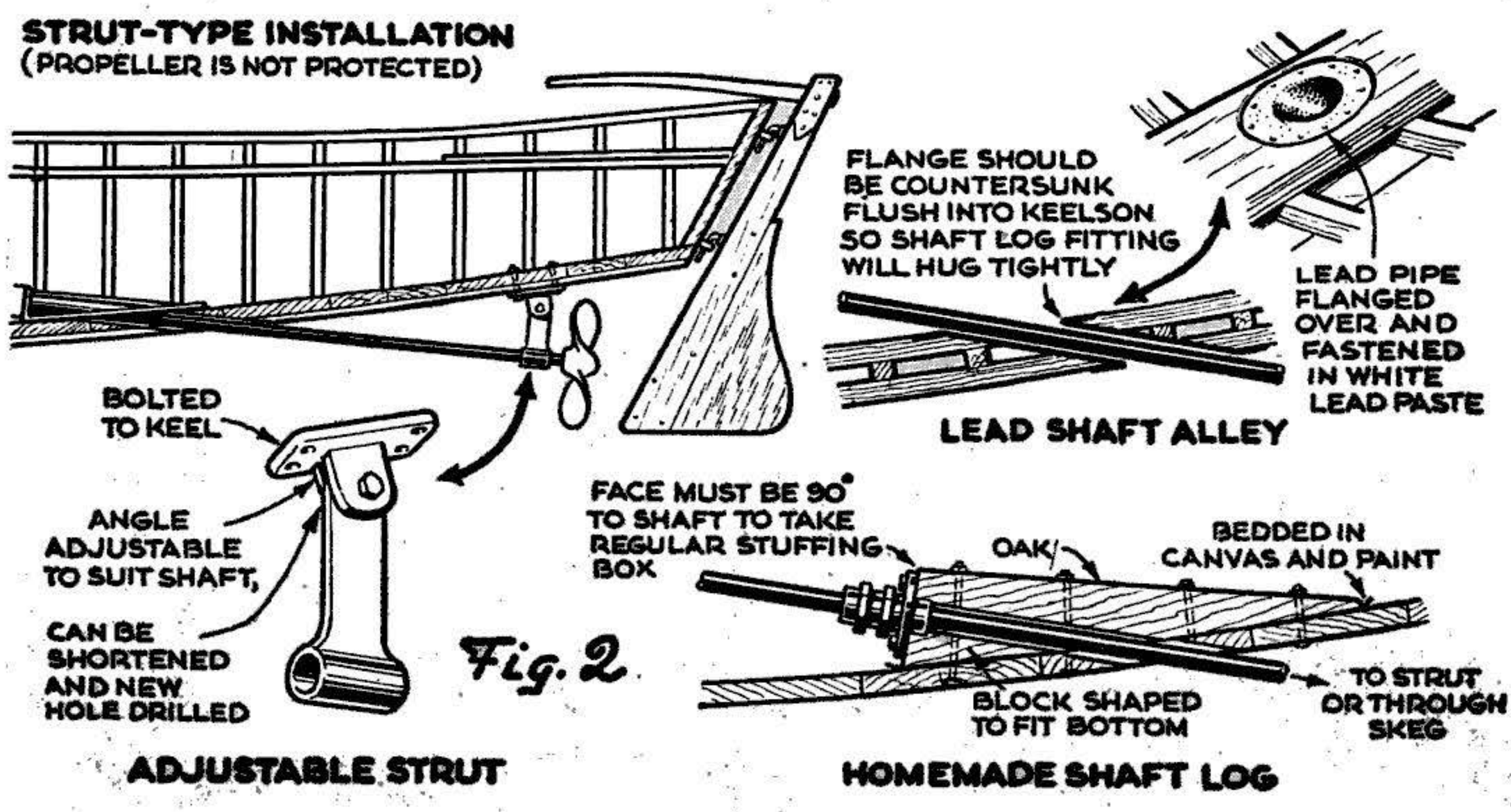



Fig. 2



Copyrighted material

aft. The common flat-bottom skiff is an especially good boat for an inboard, and its construction is usually such that it will not complicate the work of installation.

Figure 1 shows the fittings most often required and indicates the necessary work. The mounting angle of the engine will be in the manufacturer's specifications—probably 10 deg. normal and not more than 15 deg. maximum. This must be kept in mind in the early planning of the layout, for it is best to avoid having to use a universal joint in the shaft line. You must decide how far forward to set the engine so its shaft line will pierce the hull at a point that will leave clearance astern for the propeller and still not have the engine at more than the specified angle.

On some makes of inboard the flange taking the hold-down bolts is in line with the center of the shaft; on others, especially on models having a reduction gear, it will be lower, as shown in the drawing. These flanges set the height of your two beds, which should be cut accurately to hug the bottom and bolted in place at the proper distance apart. Particularly for a larger boat, the beds should be long enough to distribute the load of the engine over a good portion of the bottom.

It is a good idea to make a full-size plywood profile of your engine from the dimension sheet, attach two crossarms at flange height, and set it on the beds to represent the engine. The hole for the shaft can then be cut in the bottom at a point that will permit lining up with the engine. Get the hole as nearly correct as possible, but final alignment will have to be done with shims or by chiseling after the shaft has been installed in its stuffing box and outer bearing or shaft. The patented type of stuffing box shown in Fig. 1 simplifies installation, but a homemade wooden shaft log can be installed as in Fig. 2 and used with a regular stuffing box.

A wooden skeg can be made up, as shown in Fig. 1, and bolted to the bottom of the boat to take an after bearing, or an adjustable skeg can be used. The former requires a shaft hole bored through its length. If it is made in two lengthwise halves, the shaft alley can be hollowed partly in each. Bolts holding it to the hull must, of course, clear the alley. An iron skeg or shoe can be fitted on to protect the propeller against the bottom and drift.

Advice on the diameter and pitch of propeller can be obtained from the maker of your engine if you furnish him particulars of your boat. There must be at least 1" clearance for the propeller tips (Fig. 1).

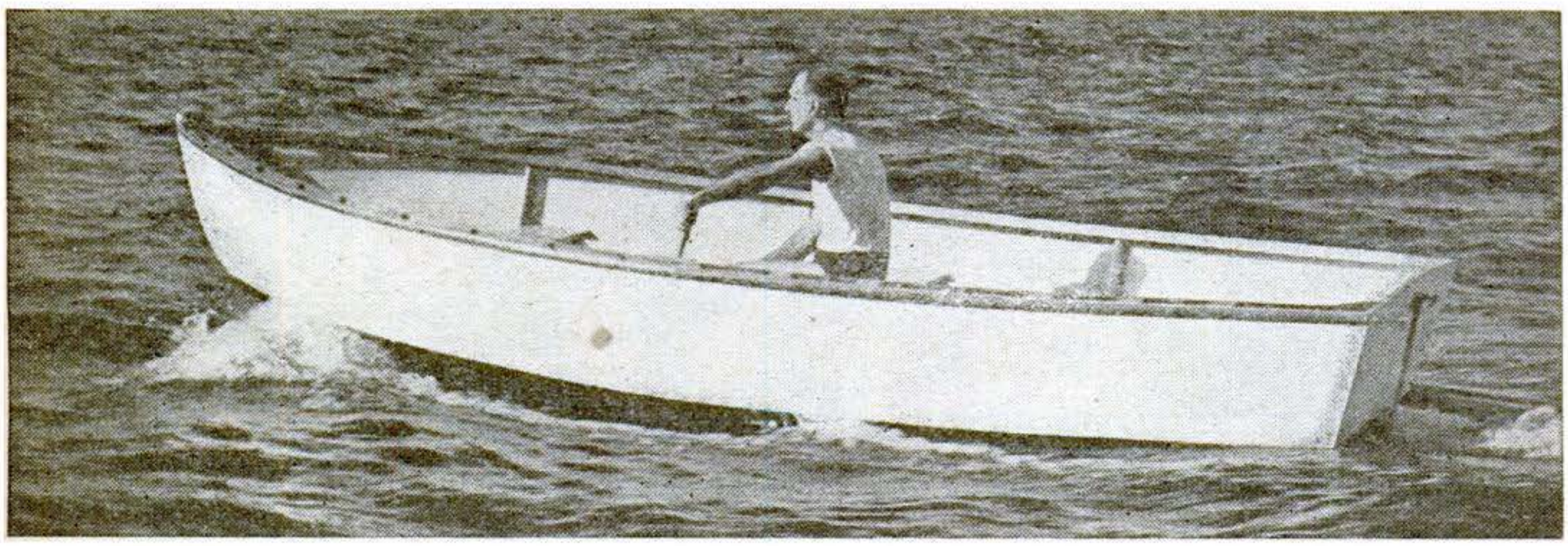
After final fitting of the shaft and installation of a thrust bearing if it is necessary, the engine is set in place on its beds and lowered or shimmed up until its coupling perfectly engages the other half of the coupling keyed on the inboard end of the shaft. When you are finally sure of accuracy, lag-screw the engine down.

Considerable attention should be paid to having alignment of engine and shaft just right, or the engine will not perform satisfactorily. It will be wise to check a few times during the season if you have a light boat.

The rudder is installed last. It may be either metal or wood. The general shape will have to suit the slant of the stern.

An installation job can be complicated in a boat with bottom frames or ribs and a keelson, as in Fig. 2. One way to accomplish it is with a piece of lead pipe of an inside diameter larger than the shaft. Put the pipe through a hole cut or bored through everything at approximately the angle required, and then cut its end off on a slant and flange it down in white lead paste for a watertight fitting. An adjustable stuffing box or wooden shaft log is fitted over the inboard end. Many manufacturers of engines supply data on installation, and some provide stock fittings.

**This handy 16' utility craft comes with its 2½-hp. inboard installed—a stock model complete and ready to run. Most ready-made jobs include a reverse gear or clutch for warming up in neutral and easy starting.**





Copyrighted material

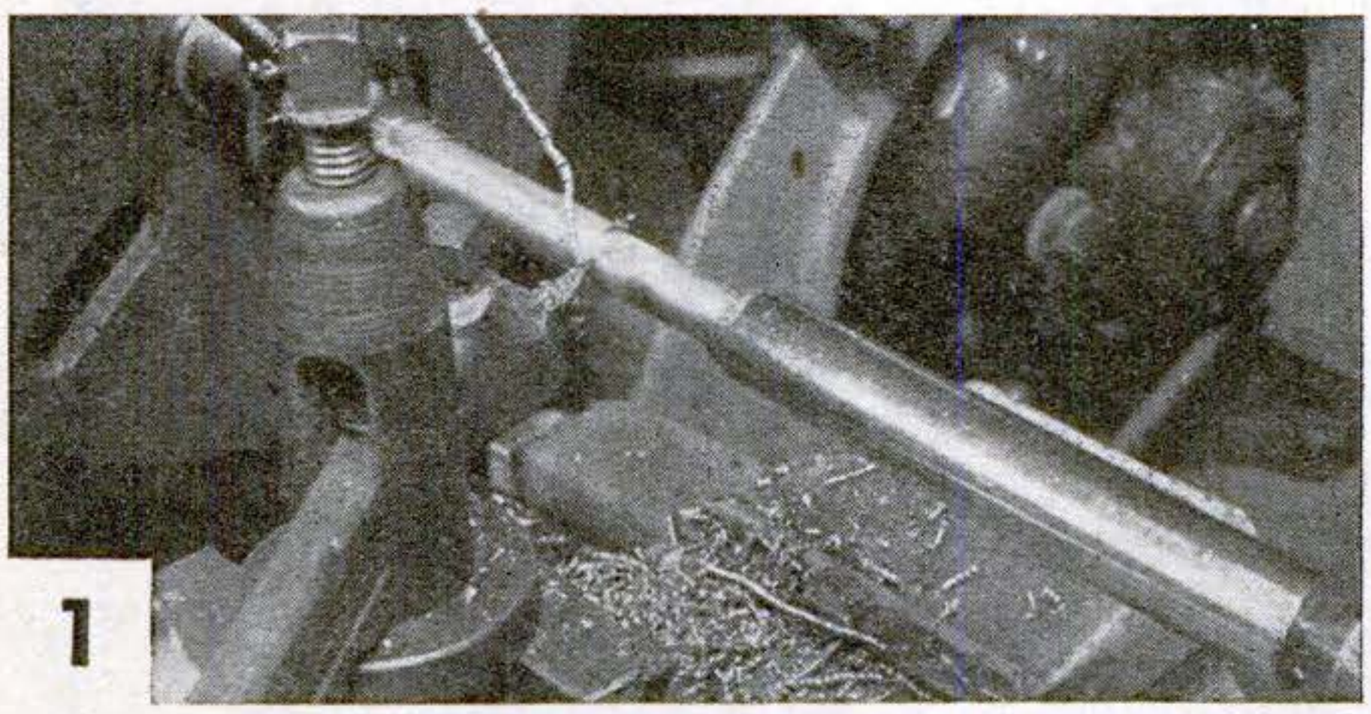
# Nonmarring Hammer Has Replaceable Lead Faces

SOFT-FACE hammers, always valuable for work on surfaces that might be damaged by regular ones, have a place in every shop. This one employs lead faces that are cast in a simple mold and that can be unscrewed and discarded when no longer in usable condition.

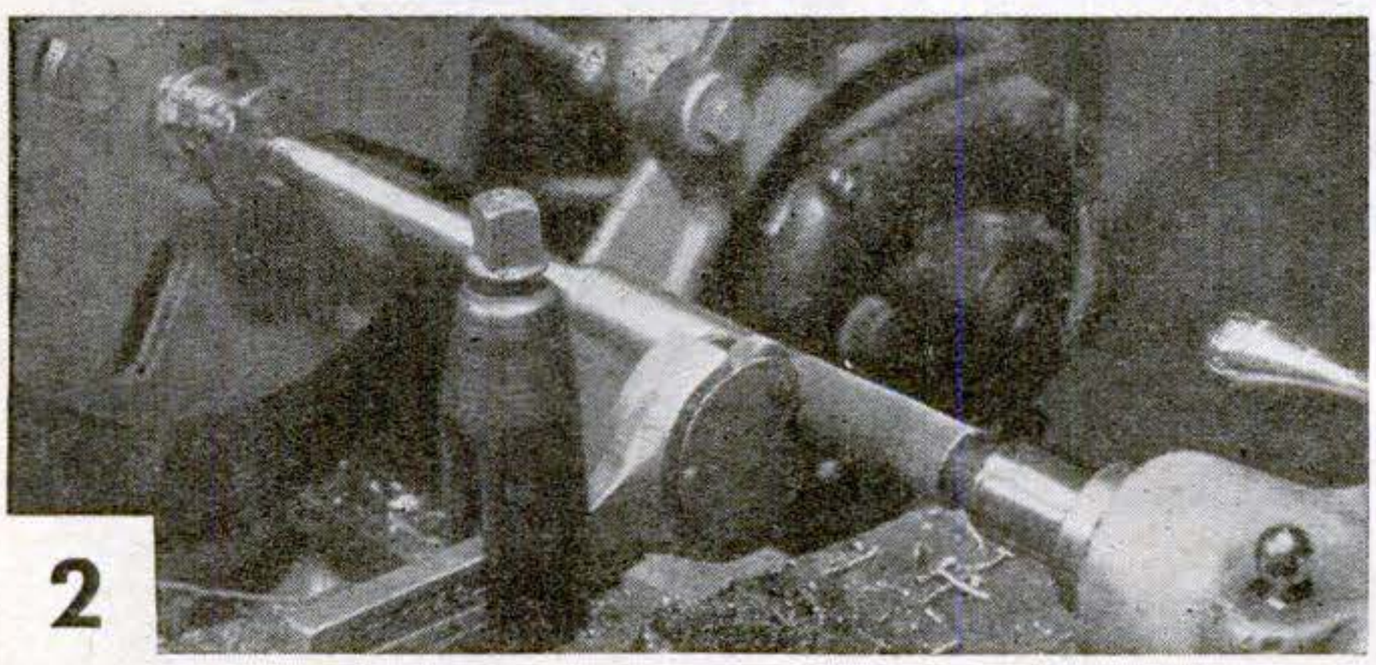
The handle and the head are made of scrap pieces of steel or brass. First turn the handle to shape (Fig. 1) and knurl between centers, using plenty of oil and medium or coarse knurls (Fig. 2). Then cut it to length and drill the grip end to remove weight. A plug should be driven into the open end and faced.

Machine the head to shape between centers, cut it to length, and face and thread the ends (Fig. 3). Drill a hole for the handle, which should then be rechucked and filed lightly for a drive fit in the head.

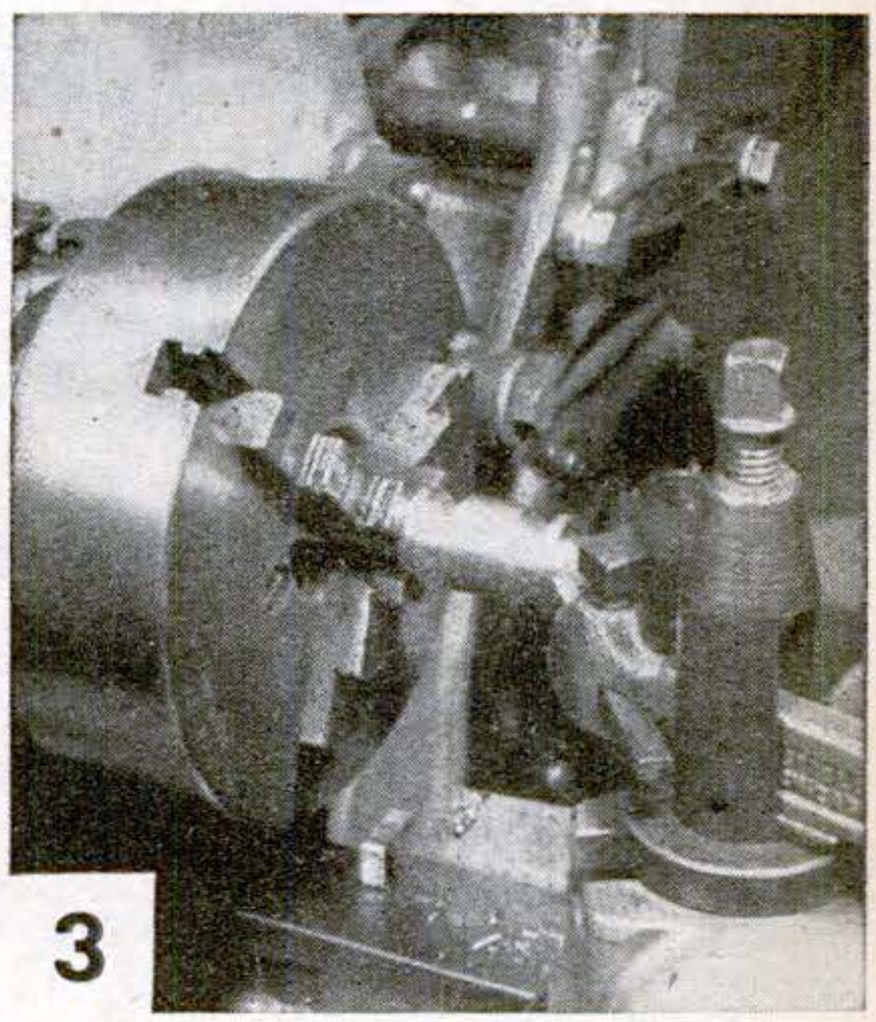
The lead faces are cast in a simple mold consisting of a hardwood block and the stub end of a ½"-13 bolt, as shown in Fig. 4. It should fit the block snugly but not tightly, and should be oiled before the lead is poured to eliminate any chance of sticking. After the lead has solidified, push through the bolt and the lead cap and unscrew the latter.—WILL THOMAS.



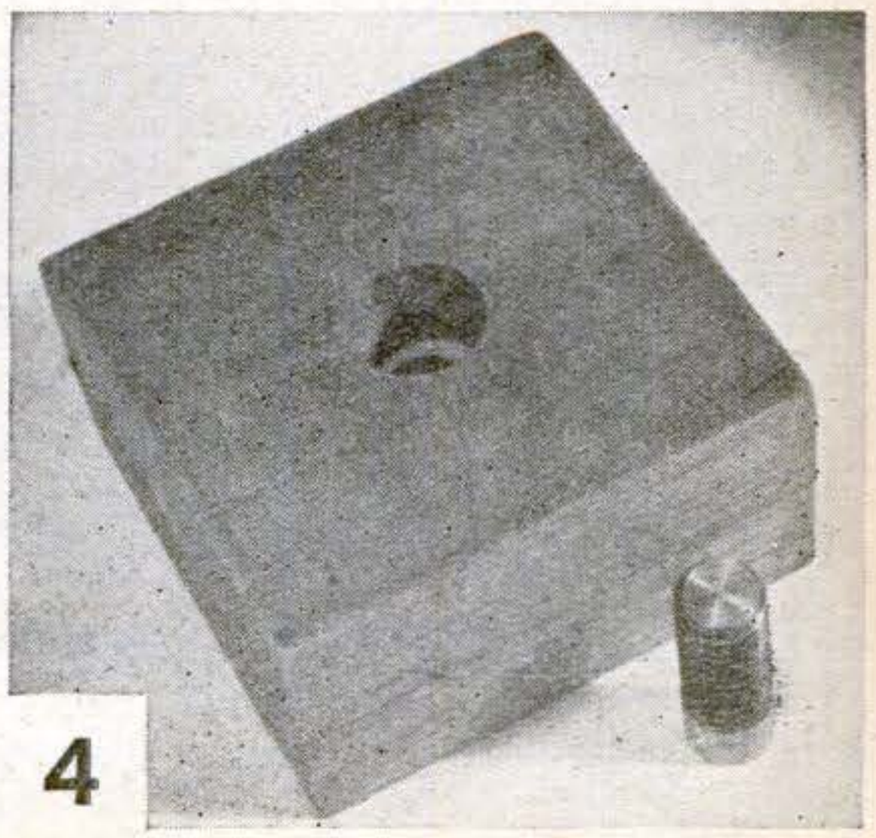
1



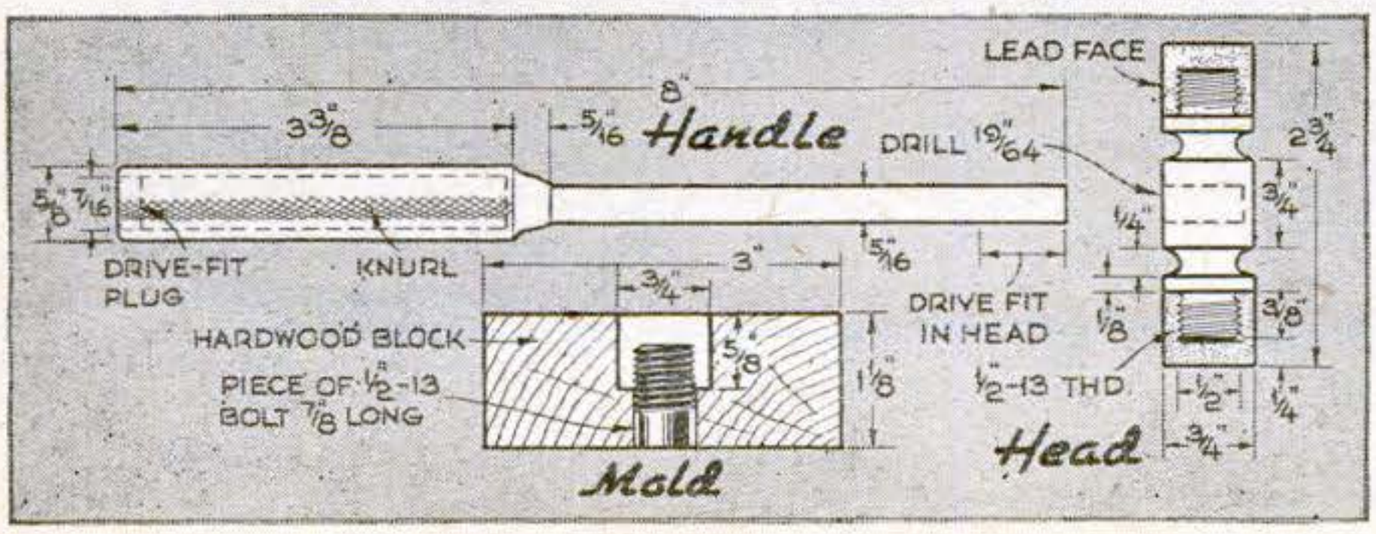
2



3

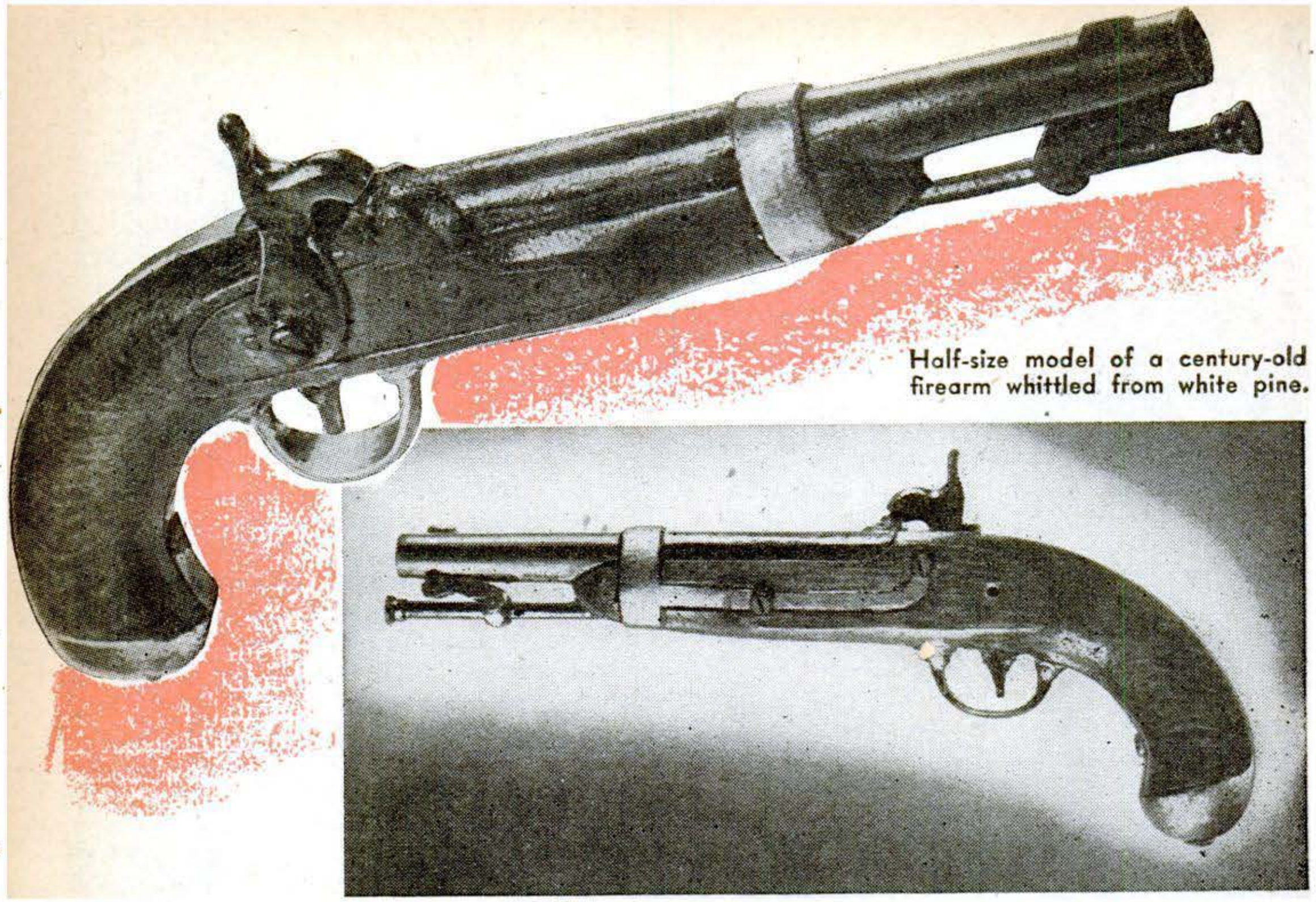


4






Copyrighted material



Half-size model of a century-old firearm whittled from white pine.

# Carving a Cap-and-Ball Pistol

## 1847 Side Arm Carried by U. S. Troops in Mexican War

**By Carl G. Erich**

WHEN American troops set off to the war with Mexico nearly a century ago, this is the type of pistol that some of them carried. It is a quaint old side arm of the cap-and-ball type. Our whittled model is a true replica, finished to resemble the brass, iron, and wood of the real gun.

The model shown was carved half size, and the drawings are also half size, but the craftsman can readily double the dimensions for a full-size model if he prefers. For half scale, the layout can be traced directly from the facing page. Transfer the side view with carbon paper to a piece of white pine 13/16" by 2¾" by 7⅛", laying out the lines as accurately as possible. Jigsaw to shape outside the lines. An extremely sharp knife should be used for the carving. Shave close to the lines and be careful not to cut away too much at any one time. The templates will help you get the desired shape at the points indicated.

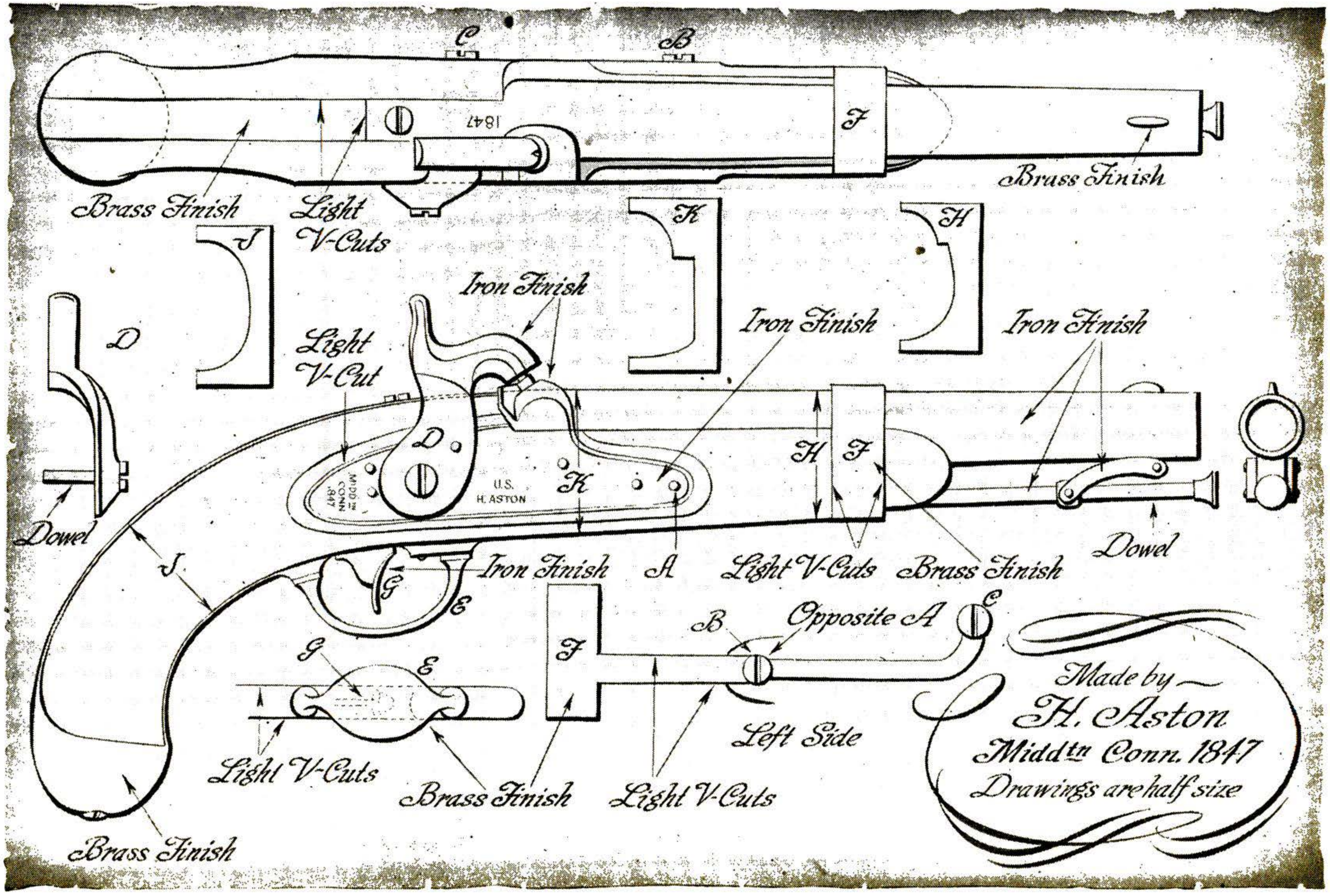
It may be best to shape the trigger and trigger guard last. Cut across the grain and you are less likely to split the wood. If a split occurs, glue the pieces back in place. Cut the hammer separately and attach it with glue and the dowel shown. The various screws may be made from dowels slotted at one end with a coping saw. For the ramrod, you may either use a dowel or carve it as an integral part of the model.

After the model is well shaped and sanded, coat the wood parts with a walnut oil stain. When this is dry, apply a coat of clear varnish to these parts. Give the "iron" parts a coat of liquid stove polish, then rub on a coat of dry or powdered graphite, and finally apply clear varnish to blend the graphite. Rub lightly with very fine steel wool when dry. Still another coat of graphite will make these parts look like bluish steel.

Paint the "brass" parts with a coat of light-yellow bronzing powder. When dry, rub lightly with steel wool and finally with powdered graphite.



Copyrighted material






Copyrighted material

# The SAW That

Forming and blanking dies made on a contour bandsaw. When die and punch are cut from the same piece, waste is avoided. At bottom, a fanciful example of trick contour - sawing.

*Photos courtesy The Doall Company, Des Plaines, Ill.*

ONE machine with the versatility of a whole shop—that's the story of the contour bandsaw that solved innumerable problems in wartime industry. It looks like a heavy bandsaw, and it does the work of a bandsaw. In addition it does many of the jobs of a shaper, milling machine, nibbler, and lathe. But it probably reaches its peak in short-run "stampings" and short-run "forgings," for often it can machine finished pieces of this kind in the time it would take to make the die or pattern alone. It can also make dies, punches, and die shoes —all three in one operation—and jigs and fixtures, special parts, templates, and cams. It cuts wood, plastics, rubber, and both tough and soft metals.

The machine is a combination bandsaw, band file, and band finisher. It uses new, narrow saws and has a built-in butt welder for welding the blade ends in internal sawing operations where the saw is cut and inserted in a hole in the work. Removal of the saw and substitution of a file or emery-cloth band convert the machine to power filing or polishing.

Copyrighted material

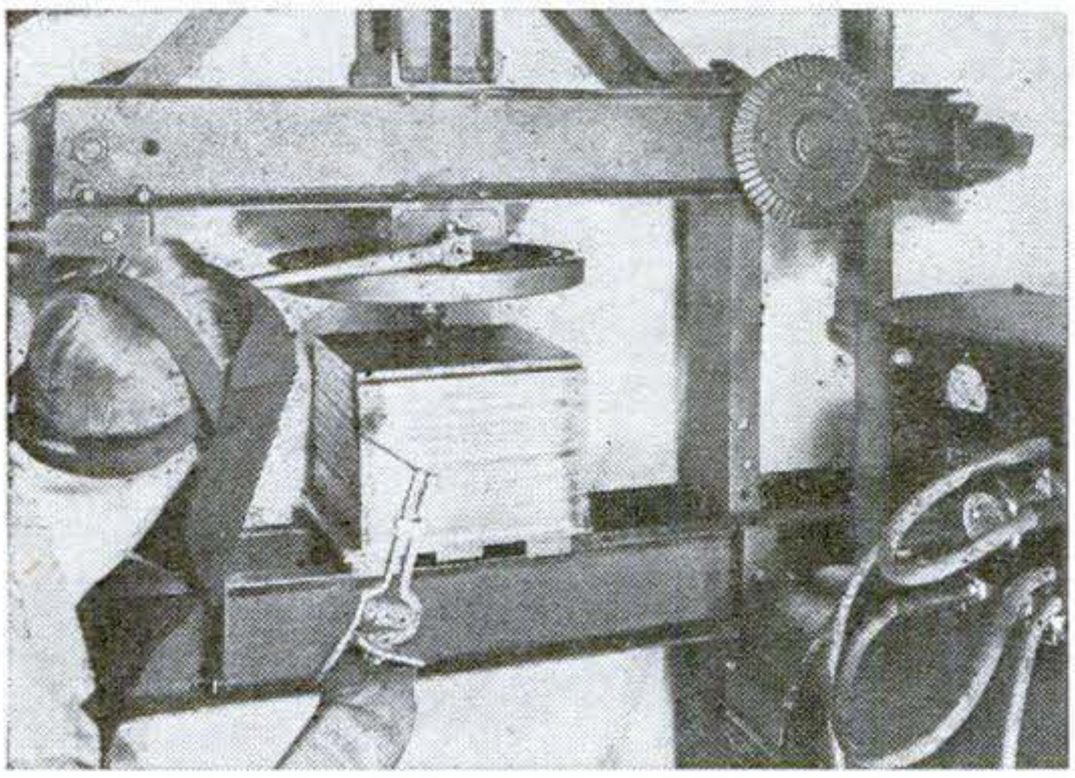
# Cuts Corners for Industry

In shaping and milling jobs, the contour saw slices off the entire section to be removed in one operation, cutting a 1/16" wide slit in the material rather than reducing the waste to chips in what on other machines is often a series of slow cuts. Instead of biting out a rough design with a succession of punch strokes as a nibbler does, the contour saw leaves a clean, finished edge. Whereas a nibbler is limited to sheet metal and thin plate, blocks 8", 10", and 12" thick, depending on the capacity of the model, can be handled on a contour saw.

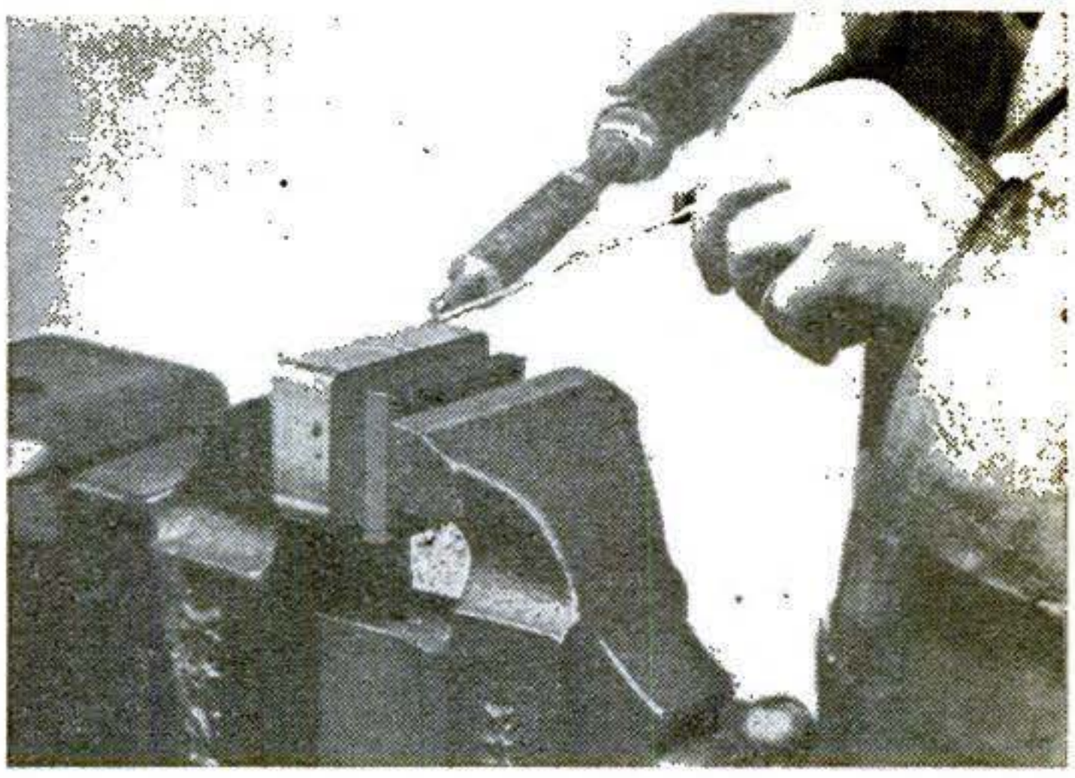
True circles are cut on the contour saw by revolving the work on a fixed pivot, turning it into the saw just as into a lathe bit, with the difference that the saw cuts its narrow slit where the lathe tool makes chips of the waste. The diameter of the turning is not limited even by the throat of the machine, since the pivot is set up on the outside.

Short runs requiring the making of 50 to 500 identical parts, far too few for anything approaching mass-production methods, can be accomplished without dies. The metal sheets are first stacked and welded or soldered together in an arbor press or bench vise, the layout is put on top, and then all the pieces are sawed at one time. Intricate shapes may be cut with the same ease as simple ones. An entire "forging" can be sawed from a single block, or the parts can be sawed from plate and then welded together.

Cutting three or more die parts is possible in one operation, the die from tool steel the stripper from cold rolled steel,

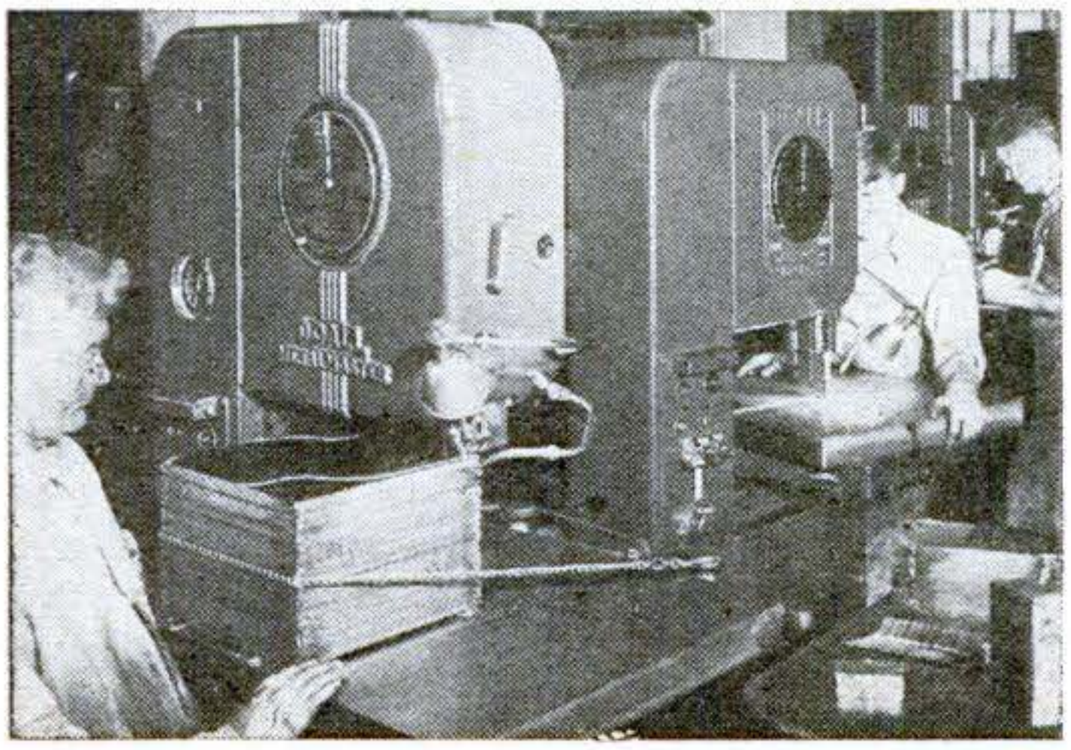


For multiple sawing, metal sheets are compressed and welded at the corners into one compact block.

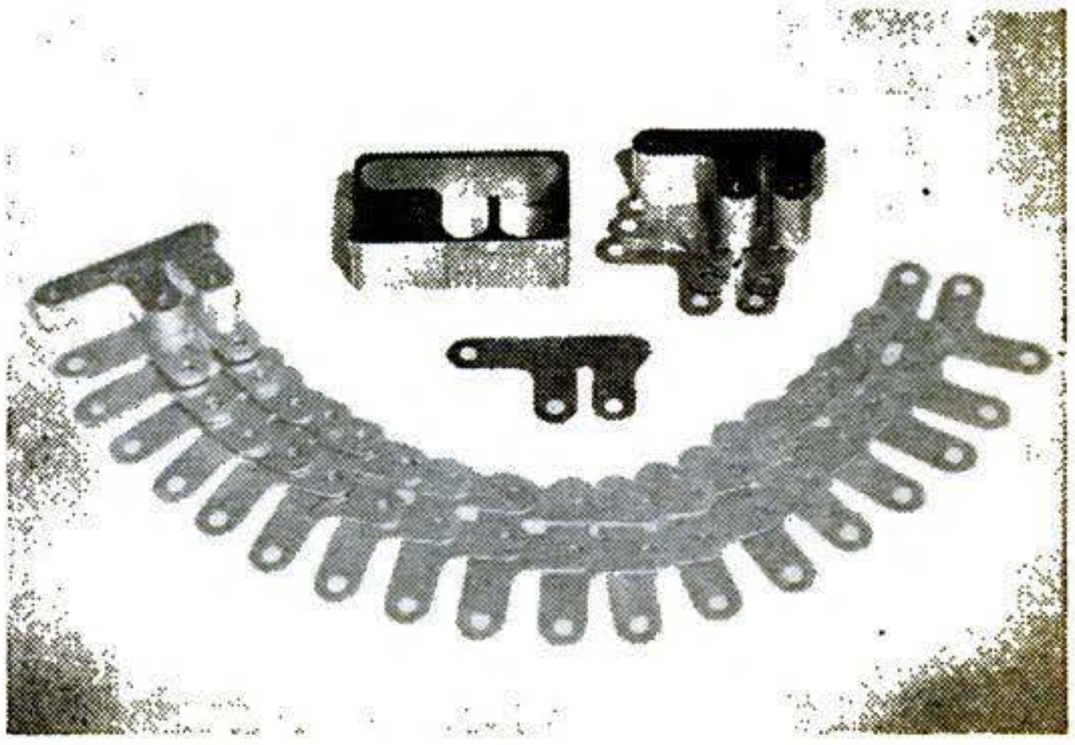


Small or thin sheets to be sawed into blanks are compressed in a bench vise and soldered together.

Here 65 blanks are being cut from a single stack within ½" of full-capacity height of the machine.

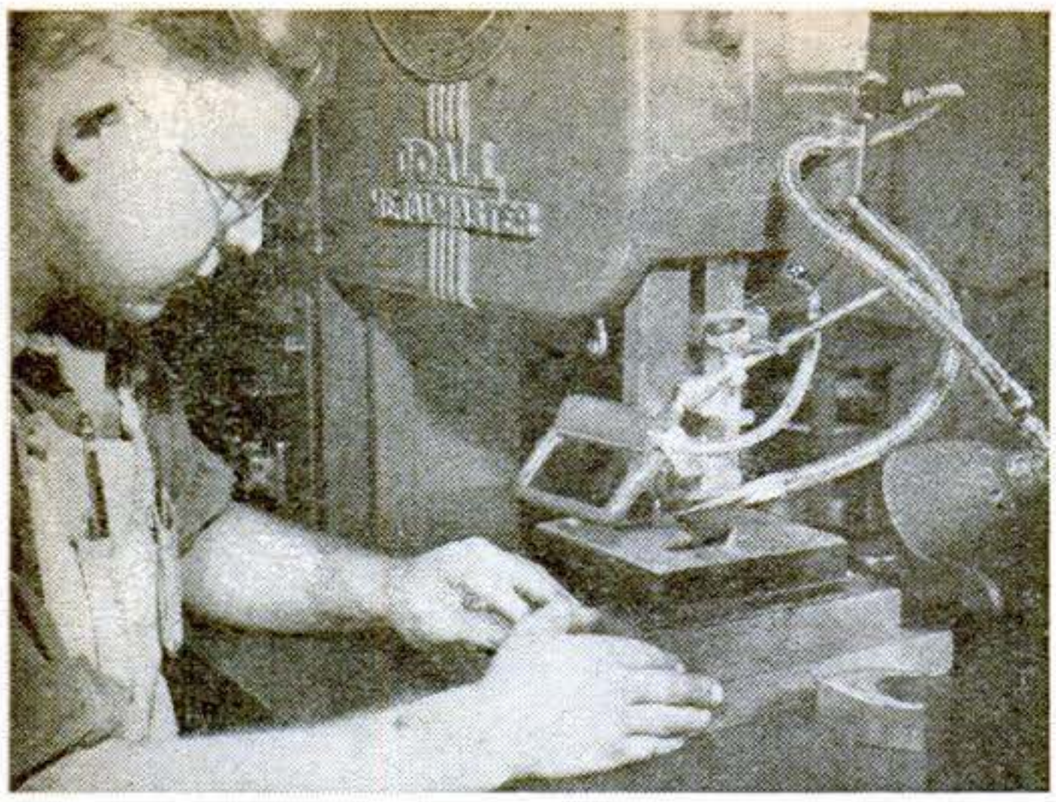


Electric-switch parts sawed out in one operation. The pattern is laid out on the top of the stack.

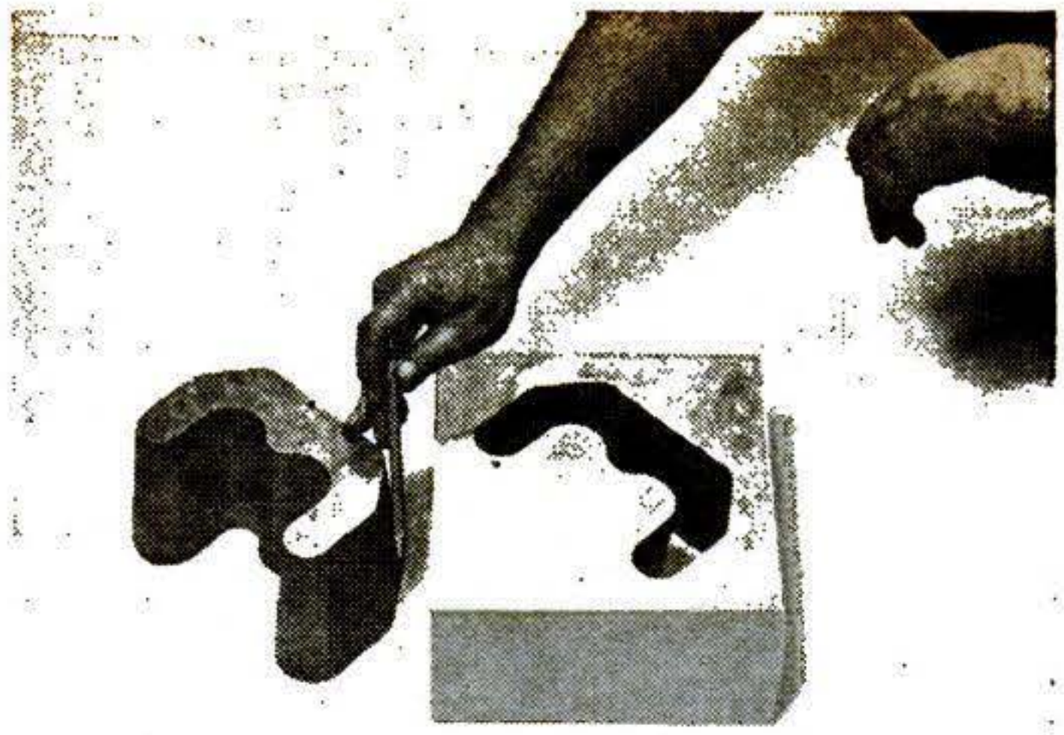




Copyrighted material

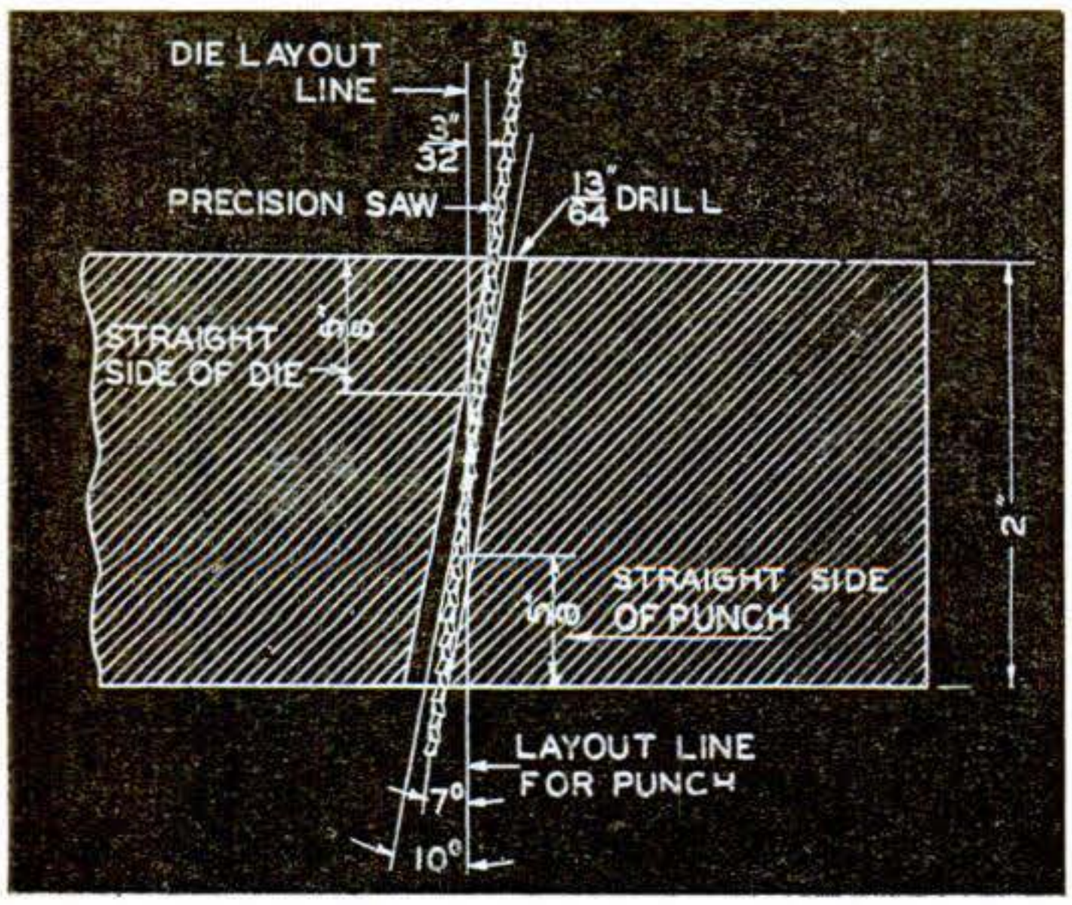


Blanks for a die, stripper, and die shoe are cut simultaneously, and then finished individually.

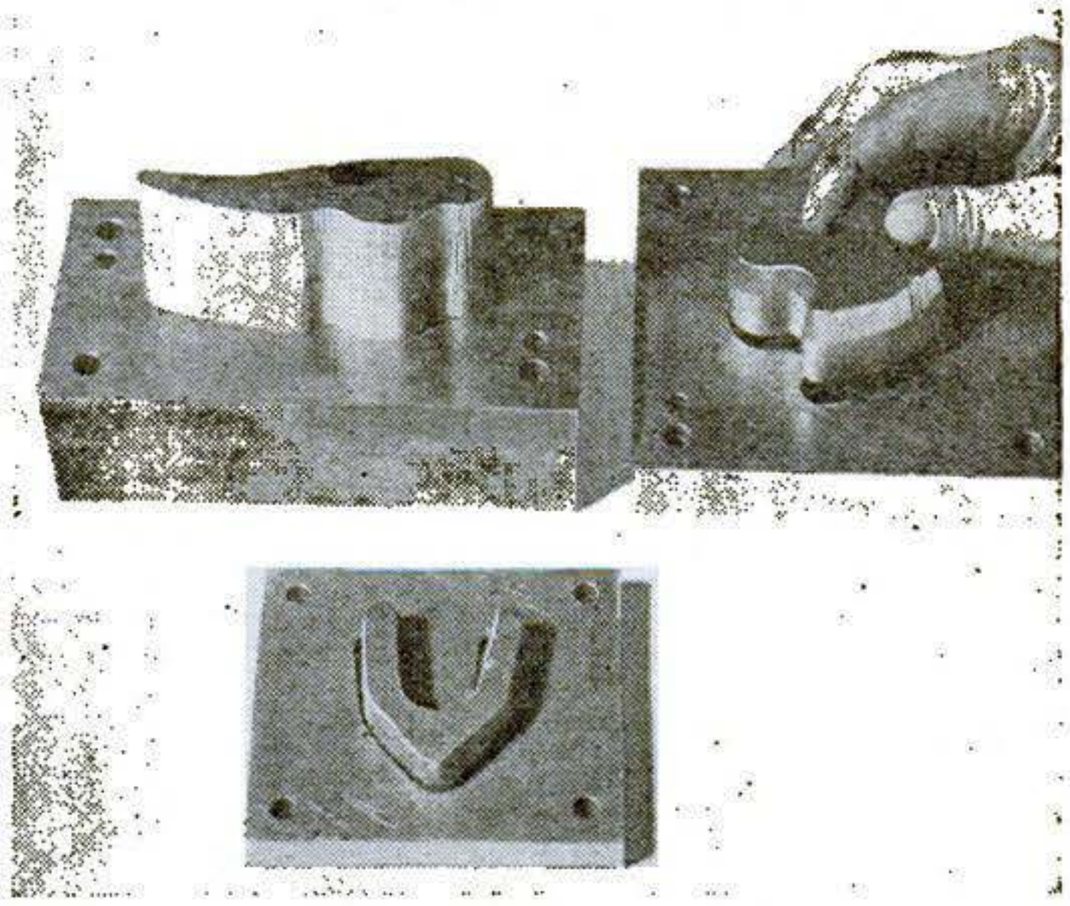


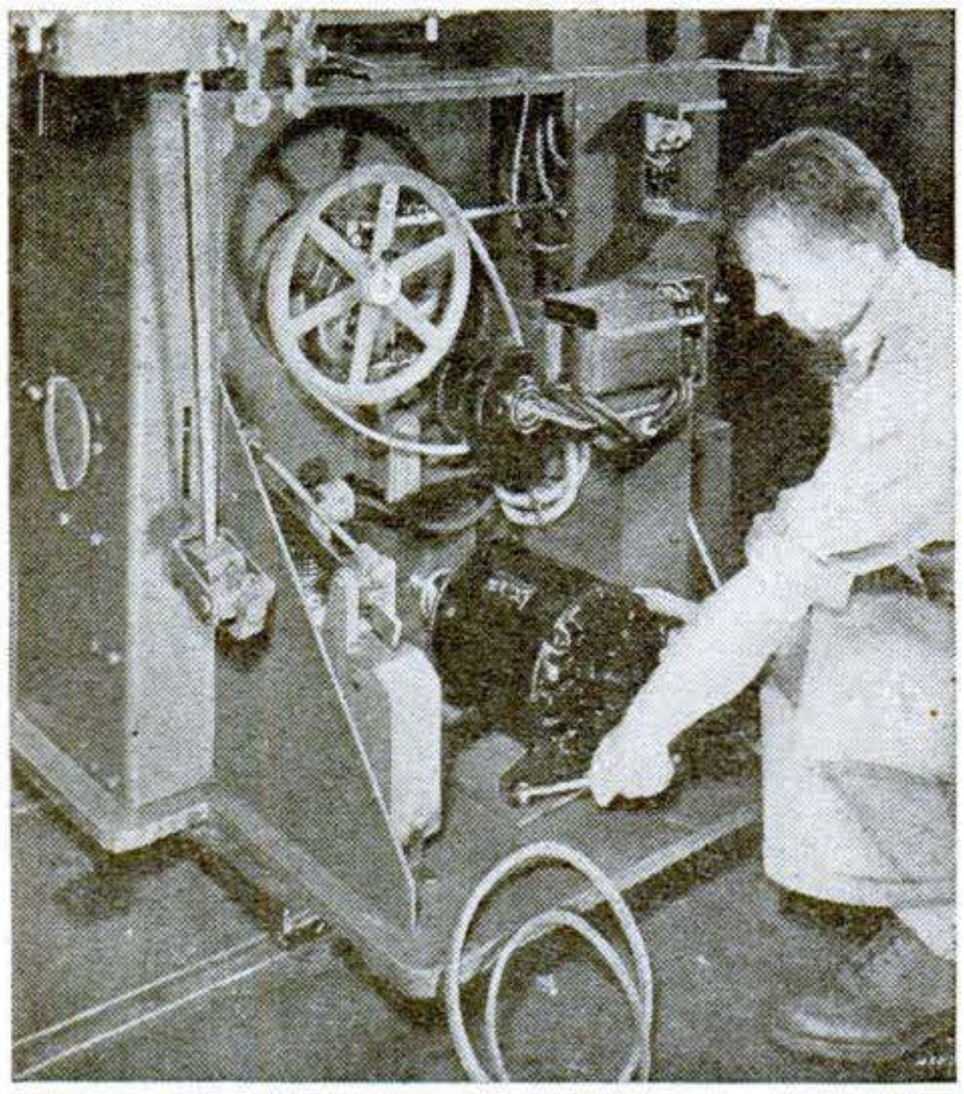
This punch and die were made from the same piece, the part removed from the die forming the punch.

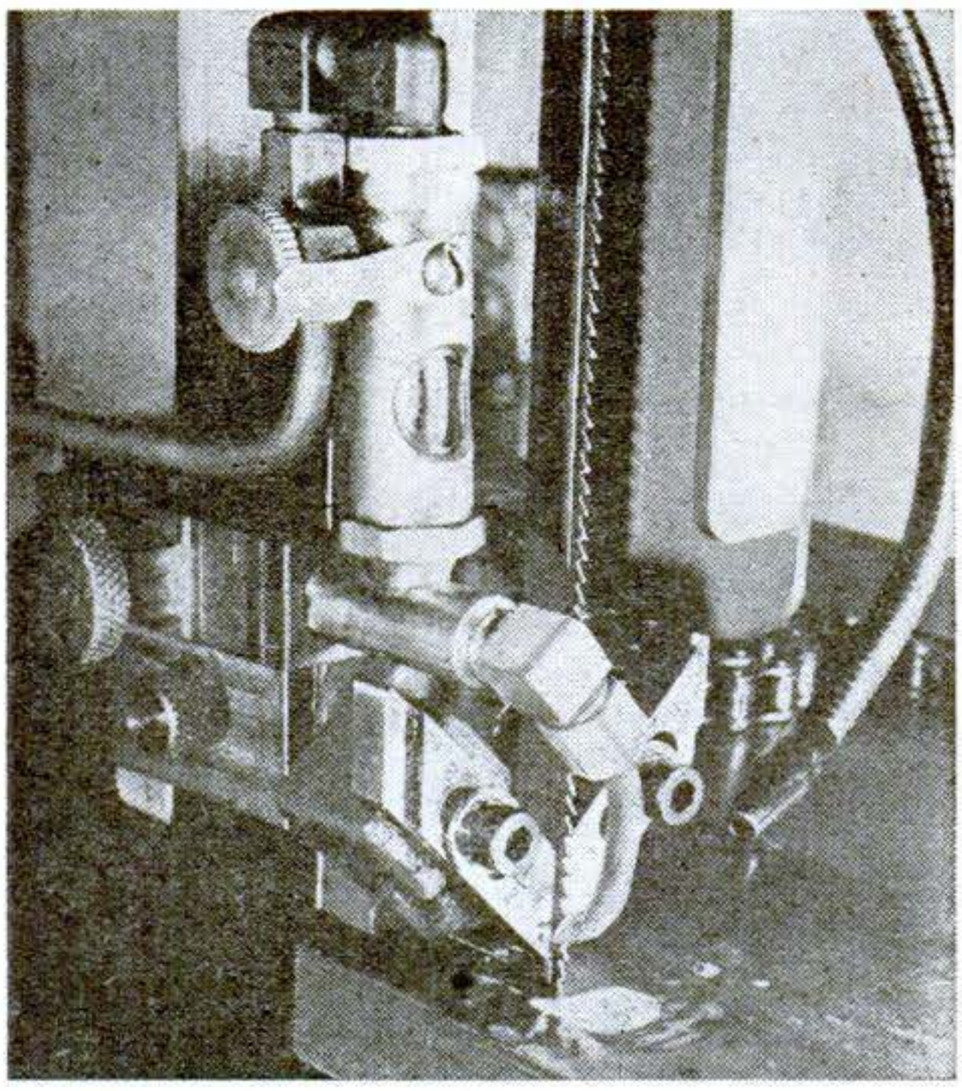
Drilling the starting hole at one angle and sawing at another permit use of the waste as the punch.




No sign of the holes is left after band-filing to size, except on the clearance side of the punches.





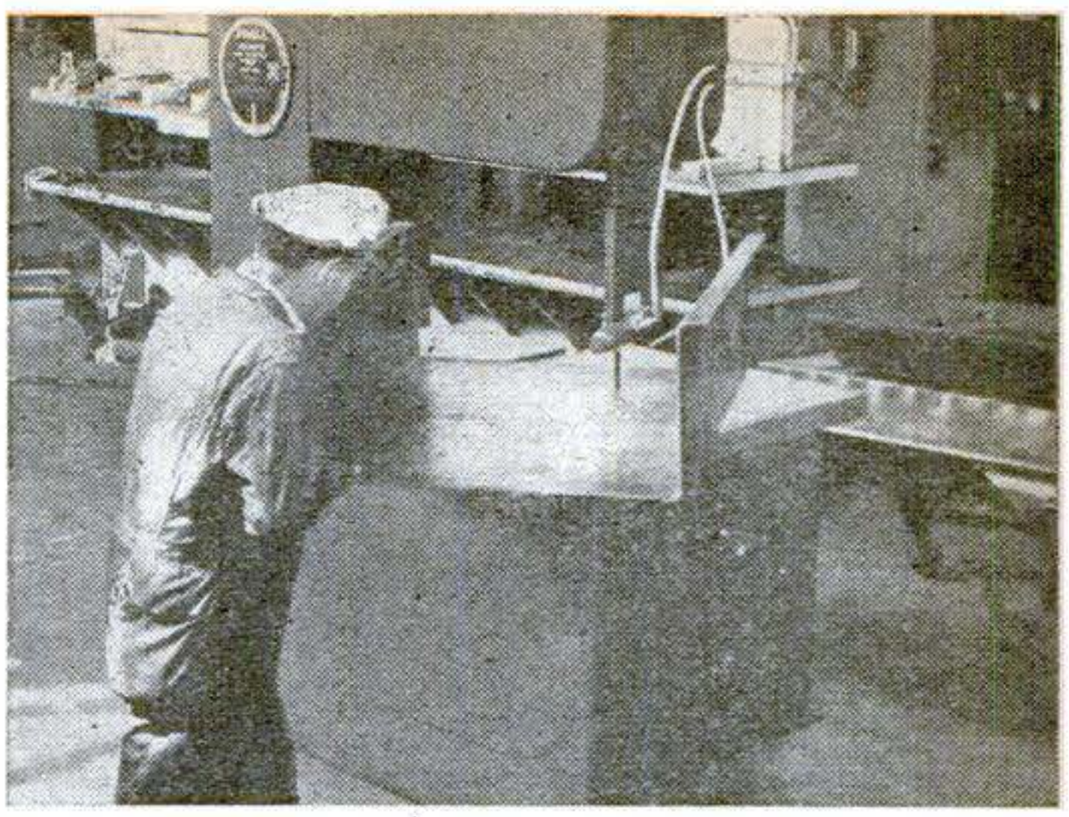


What's on the inside—motor, transmission, speed and feed controls, and butt-welder wiring—is shown at the left. Right, a close-up of the saw, saw guide, air jet, and precision lubricator.



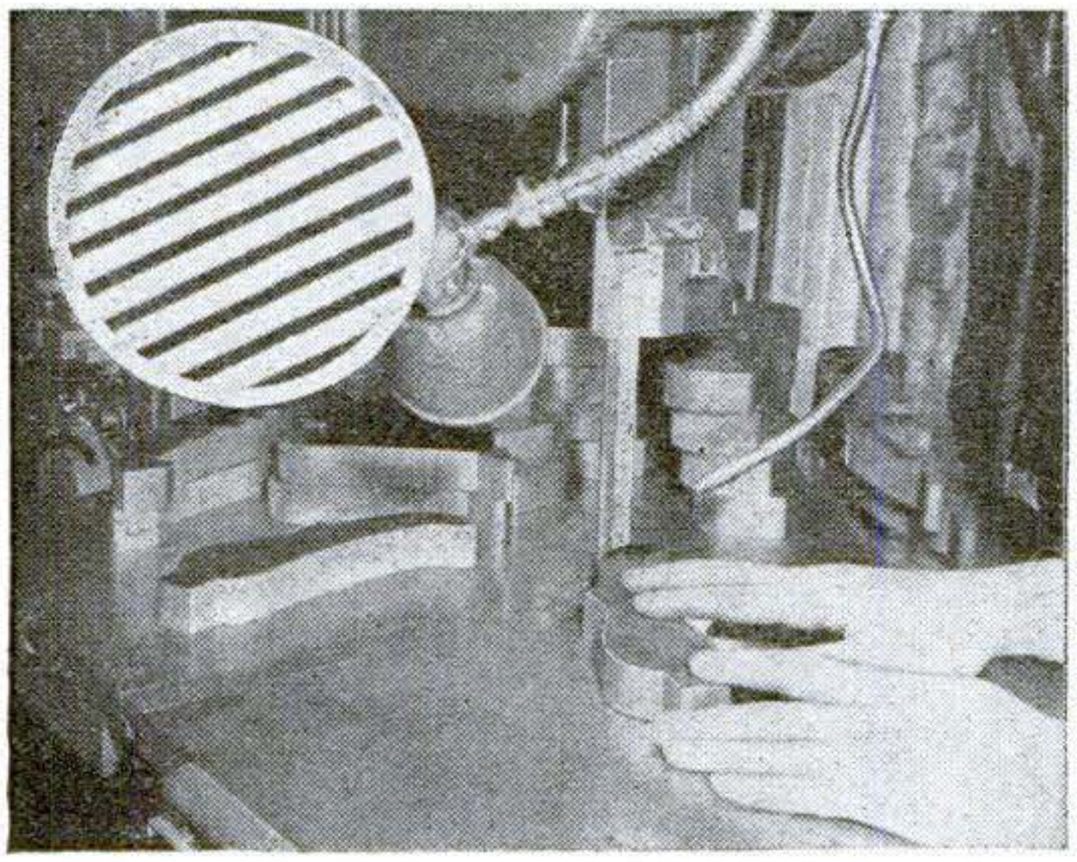
Copyrighted material

Industry finds many uses for the contour bandsaw. Here a high-speed machine slices cakes of dry ice.

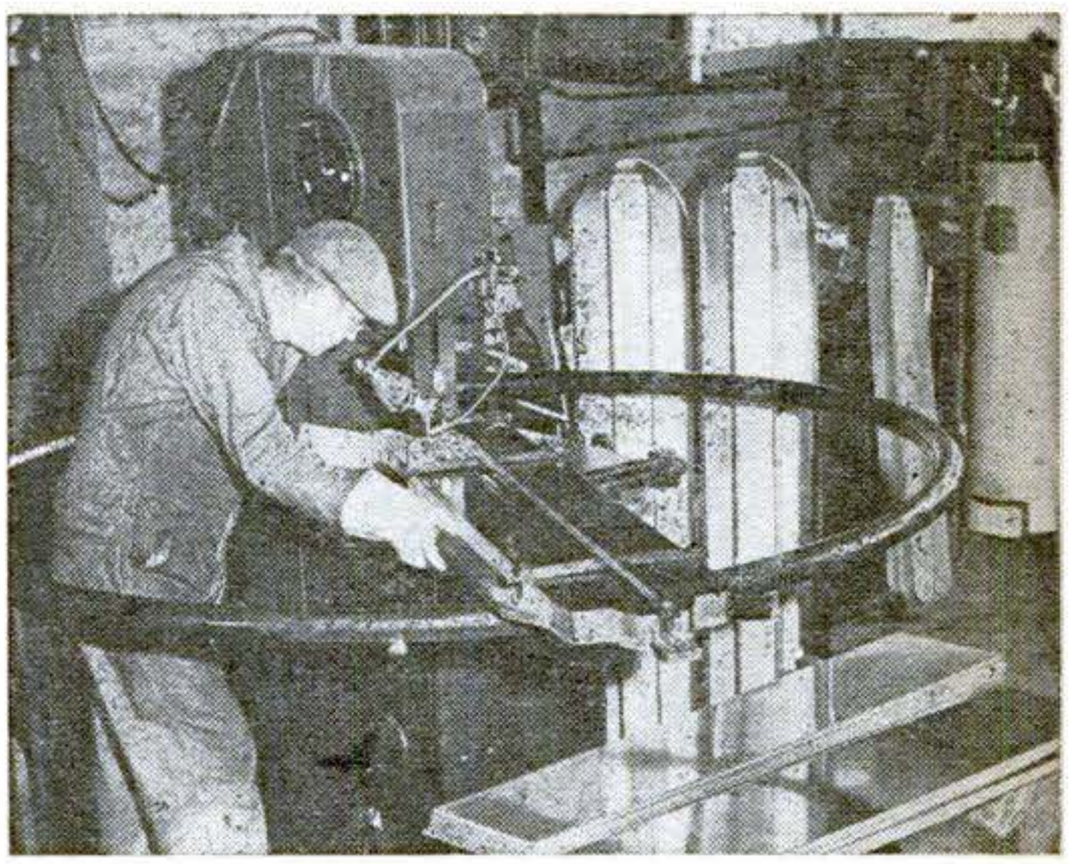


Friction-cutting steel plate at a speed of 7,000′ a minute. A cut 60″ long can be made in a minute.

Below is the setup for band-filing. In the inset are the file teeth. A polishing band is also used.

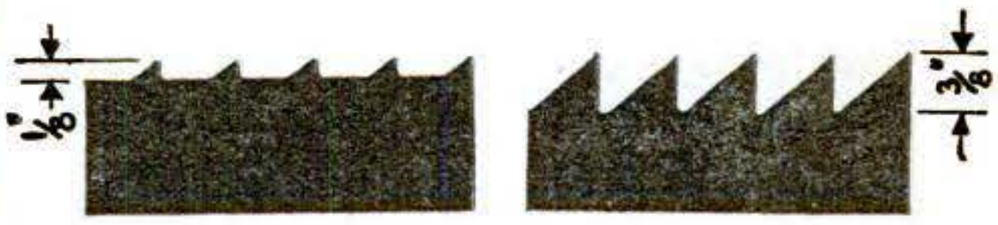


Machining airplane skis from 12 aluminum sheets. The circular rail supports the end of the stock.

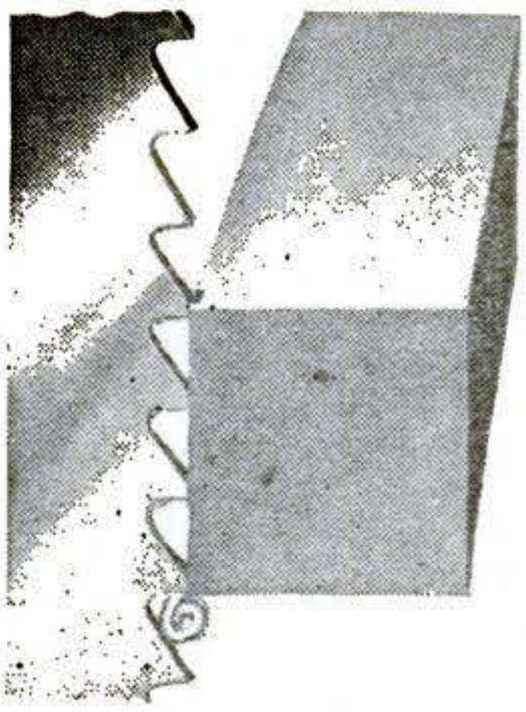


and the die shoe from cast iron. The slug cut from the die can be finished for use as the punch if the sawing is done with the table tilted at an angle determined by the thickness of the die. A starting hole for the saw is drilled at one angle—inside the layout line at top, intersecting it at the center of the stock, and emerging outside the layout line on the underside. The saw then cuts at a slightly lesser angle, leaving material to be finished off on the cutting side of both the die and punch.

Speeds of standard models of the contour bandsaw range from 50′ per minute for cutting high-chrome, high-carbon steel to 1,500′ per minute for aluminum. New high-speed models used with a special saw are capable of speeds of from 1,000′ to 15,000′ per minute, with its actual sawing speeds varying from 1,500′ to 5,500′ depending on the nature of the material and the thickness of the cut. Superhigh velocities are intended primarily for friction cutting, in which heat melts out the kerf, ½″ steel requiring a speed of 10,000′ and ¼″ steel 5,000.′




New tooth design (left) gives coarse pitch on narrow blades, whereas standard cut of same pitch (right) would weaken saw band.



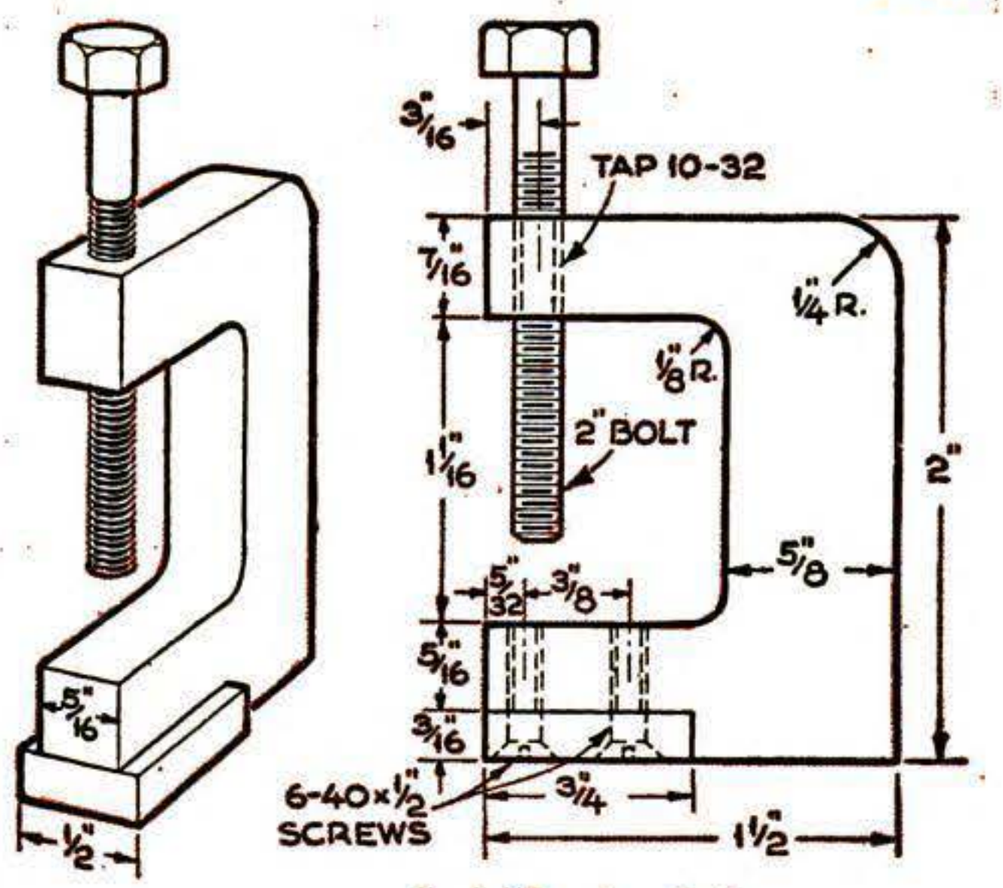
Chip production with a precision contour saw. Succeeding teeth bite further into the work.

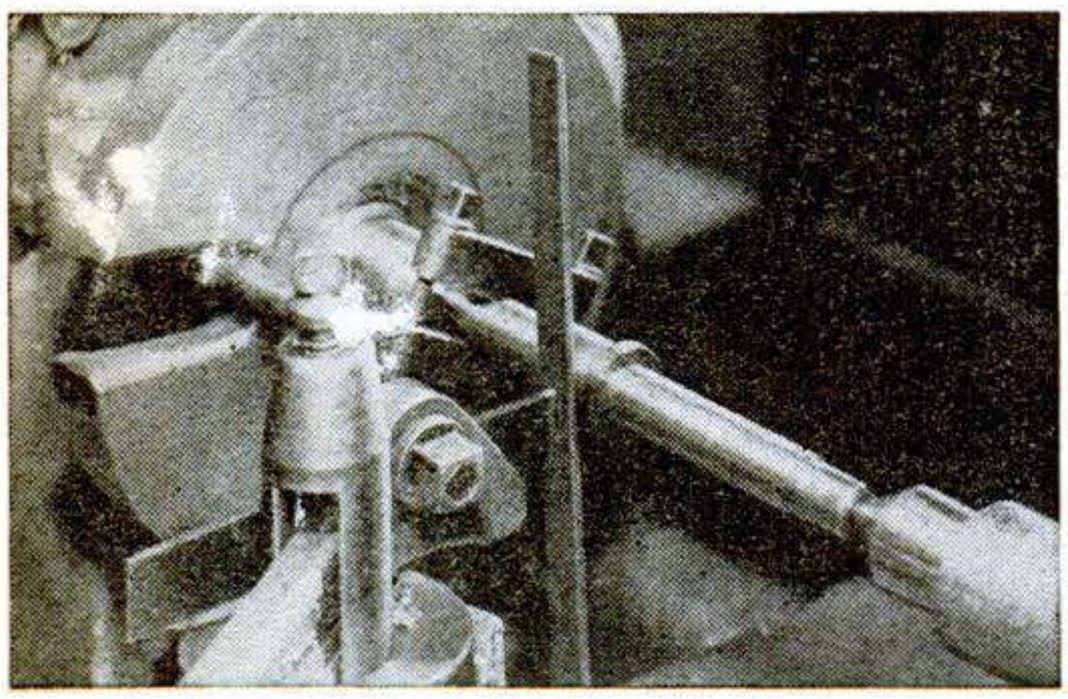


Copyrighted material

# NEW SHOP IDEAS

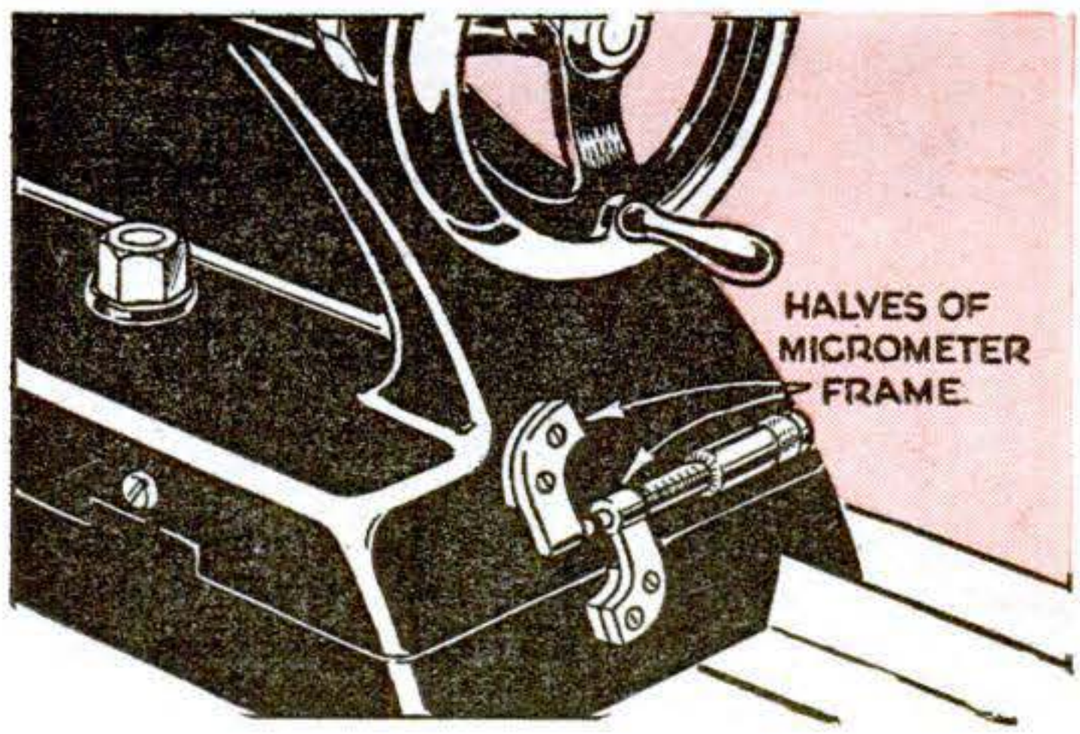
**SETTING THE CUTOFF TOOL** on the lathe at exact center height is important, since a slight error causes hogging or chatter. To adjust the tool to the proper height, place a pocket scale or other straight metal strip between the edge of the tool and the work, as shown below, holding it clear of the cross slide by light tool pressure. If the height is incorrect the scale will tilt forward or backward; when the tool is adjusted to the exact center height, the scale will be precisely vertical.—C. W. W.

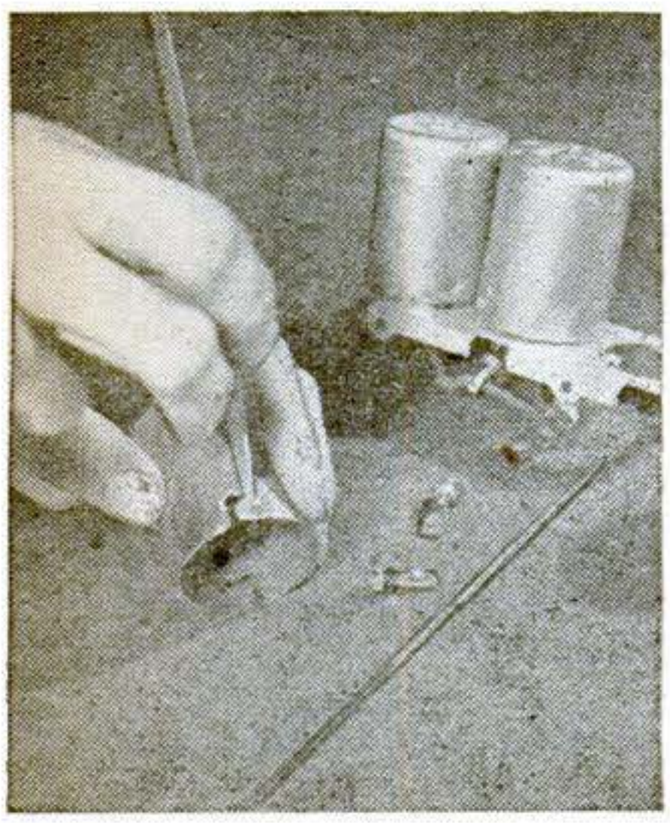


**MILLING-TABLE SETUPS,** ordinarily a matter of combining bolts, washers, nuts, hold-down bars, and spacer blocks, can be facilitated by clamps of the kind shown above. The body of the clamp is sawed from 5/16" cold-rolled steel, with a piece of 3/16" by ½" by ¾" flat stock held to the base by two machine screws. This forms an inverted T-shaped base to fit the slots in the milling table. Similar clamps of modified design could also be made for use on the drill-press table.—CHARLES M. CHAMBERS.

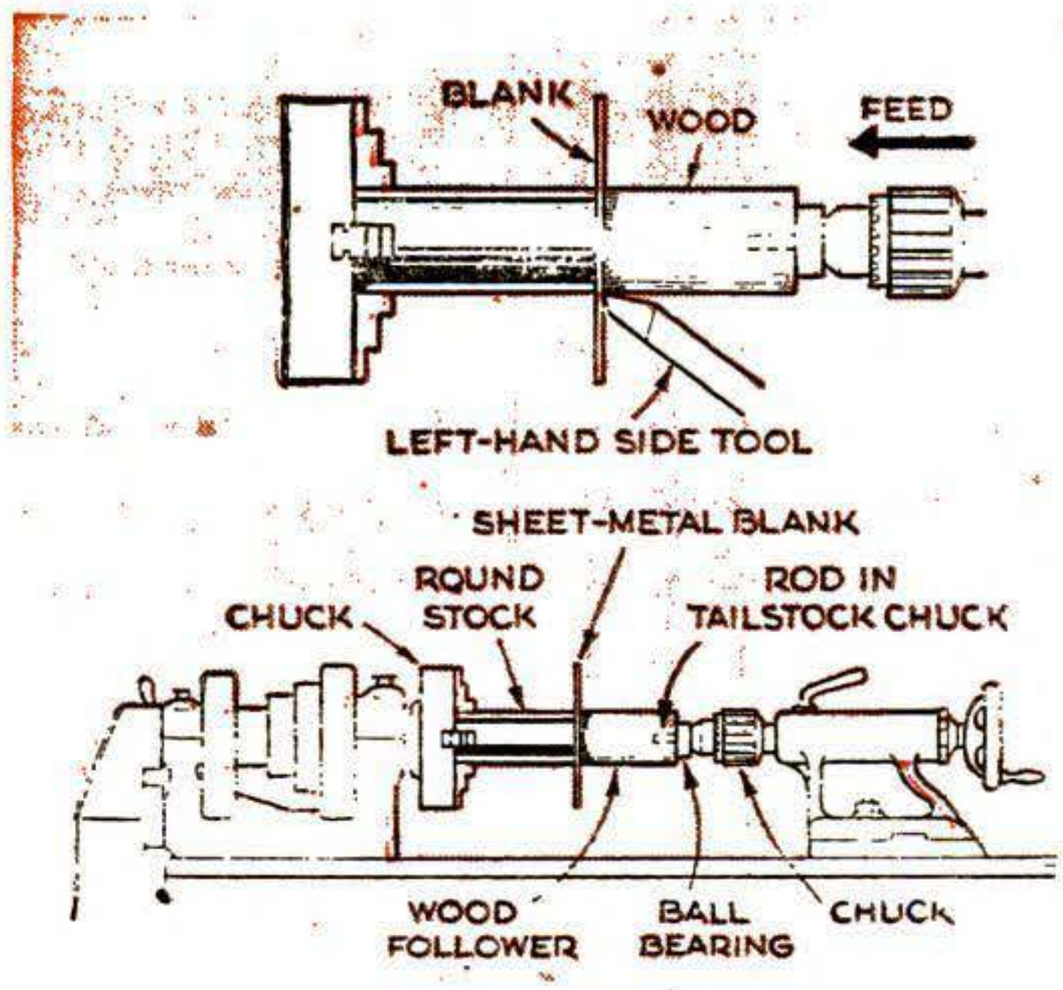
**TAILSTOCK ADJUSTMENT,** either to true alignment or to calculated offsets for taper turning, is easy with a micrometer mounted as at the right. An inexpensive die-cast one with an adjustable anvil will do. Cut the frame in half and bolt it to the tailstock so that, with the latter in alignment, the micrometer reads .500". This affords an adjustment of ½" either way. To avoid damaging the micrometer thread, always back the spindle clear, set over the tailstock, and then run the spindle up, reading from the .500" "zero".—G. EDWARD ANDREWS.



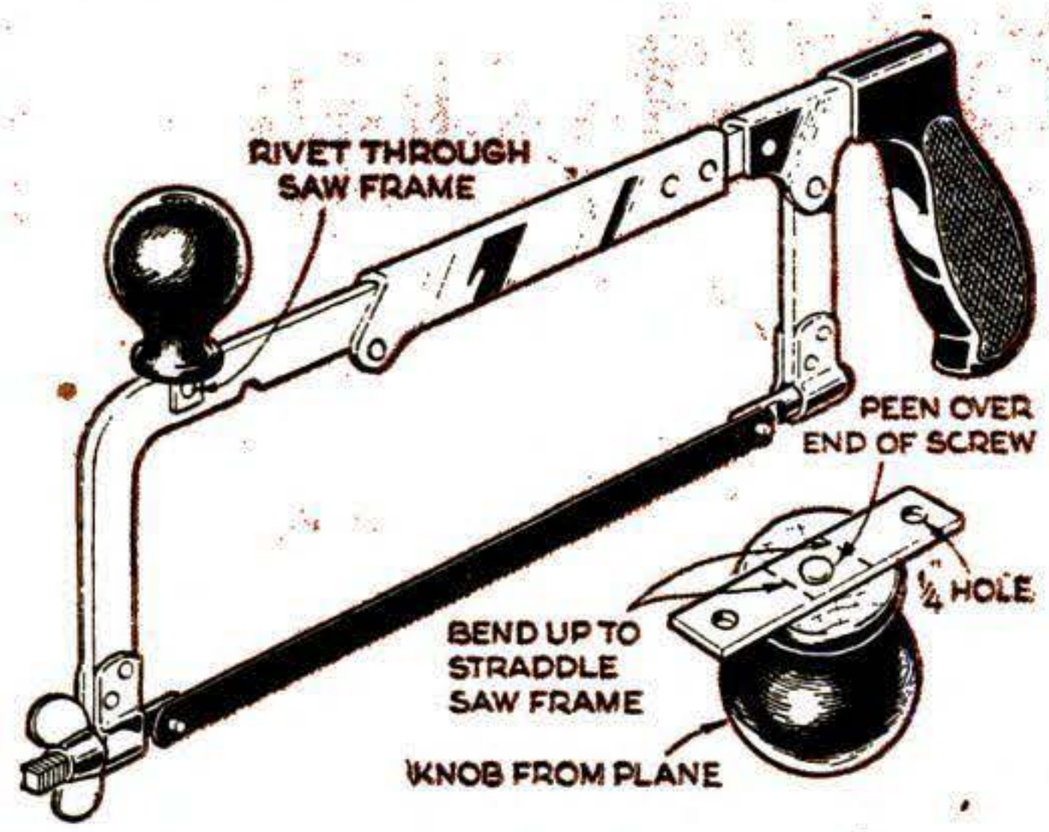
**TINY DRILLS** are easily lost or damaged unless they have their own case. An aluminum shield can from an old radio and a turned hardwood base will form an excellent protective case for drills smaller than No. 60. A brass or aluminum disk screwed to the base helps locate the fine holes in which the drills rest. Bayonet-type slots in the can engage two escutcheon pins in the base to lock the cover on. Use shellac or lacquer on the base and on the labeled can.—W. A. CONWAY.

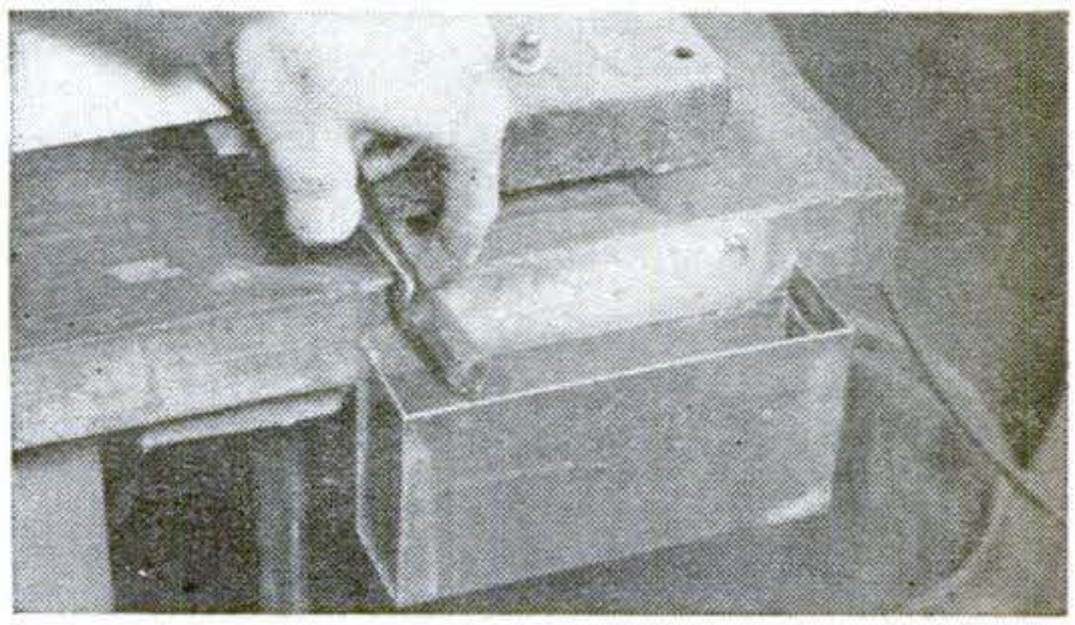
Copyrighted material




**THIN METAL DISKS** of various diameters were called for on a job I was doing, but neither a circle cutter without a pilot drill nor a circular hacksaw produced satisfactory results. I found that the method shown at left would turn out disks of brass, copper, or aluminum quickly and easily. A piece of metal was chucked, turned to the diameter of the desired disk, and the end cupped slightly. Then a hardwood dowel of the same diameter, its left end also cupped a little, was centerdrilled to fit a rod held in the tailstock chuck. A small ball bearing between the chuck and the wooden piece permitted a metal blank to be sandwiched as shown under firm pressure. The disks were cut with a lefthand tool set almost touching the wood. Formed by a combination of turning, spinning, and shearing, the disks had little burr.—PARKER E. HART.

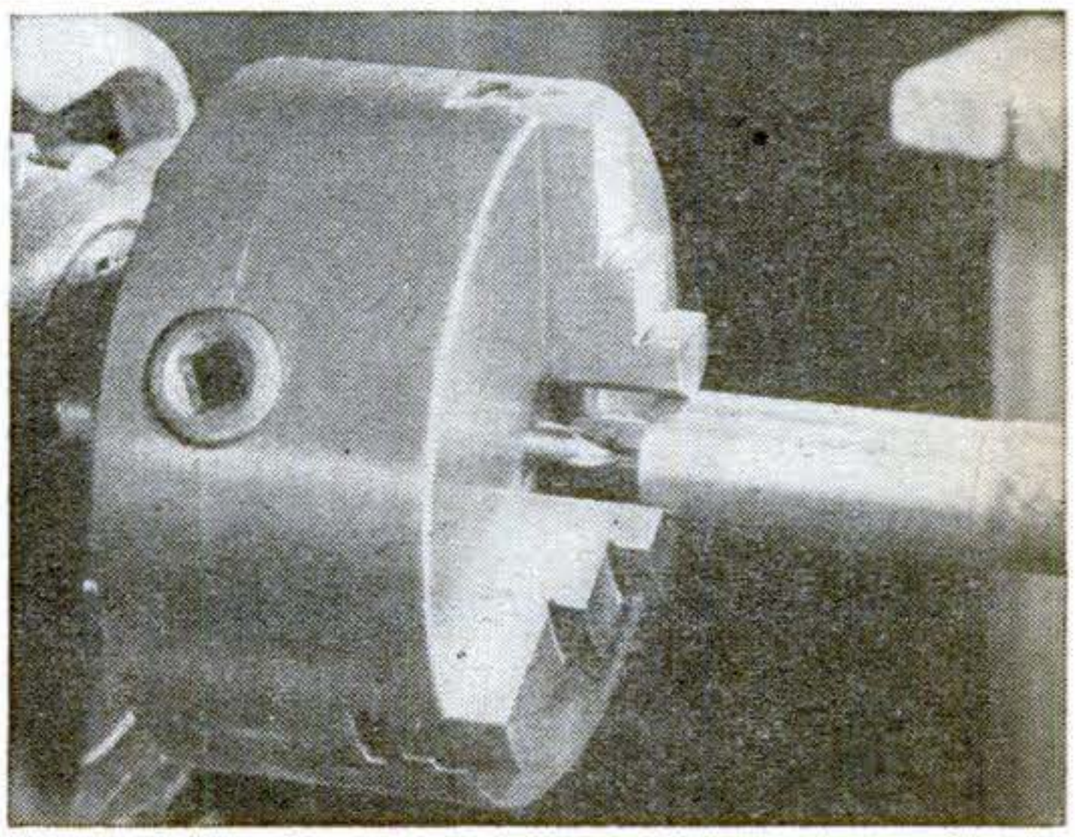
**AN OUTBOARD HANDLE** for a hacksaw, below, taken from an old plane, permits better control and more easily regulated pressure on the work. It also aids in lifting the blade slightly on the return stroke. A thin metal strap and rivet serve to hold the knob to the hacksaw frame.—JOHN KRILL.



**BURNED TOOLS** are all too likely unless you have a water can close by the grinder. The one above, made by soldering two end plates in a discarded brass letter rack, holds a sufficient amount of water, won't rust, and is always conveniently at hand. In the absence of a letter stand, a similar water can might be made by soldering up sheet brass, copper, or galvanized iron. Don't use tin-can stock; it is likely to rust through and leak in a short time.—W. A. C.

**CENTERING ROUND STOCK** may be done in short order with the setup shown at the right. The centerdrill is mounted in a taper shank fitting the headstock spindle, on which a three-jaw chuck is also mounted. Set the drill in its shank so that the chuck jaws project slightly beyond the drill point. The work is placed against the drill and the chuck jaws turned against the work to center it. Leave the jaws just loose enough so that they can revolve around the work, which is kept from turning with the left hand while the right hand feeds in with the tailstock hand wheel. Use a slotted bushing to protect the jaws from wear if much work is to be centerdrilled.—C. W. W.





Copyrighted material

# Props Put

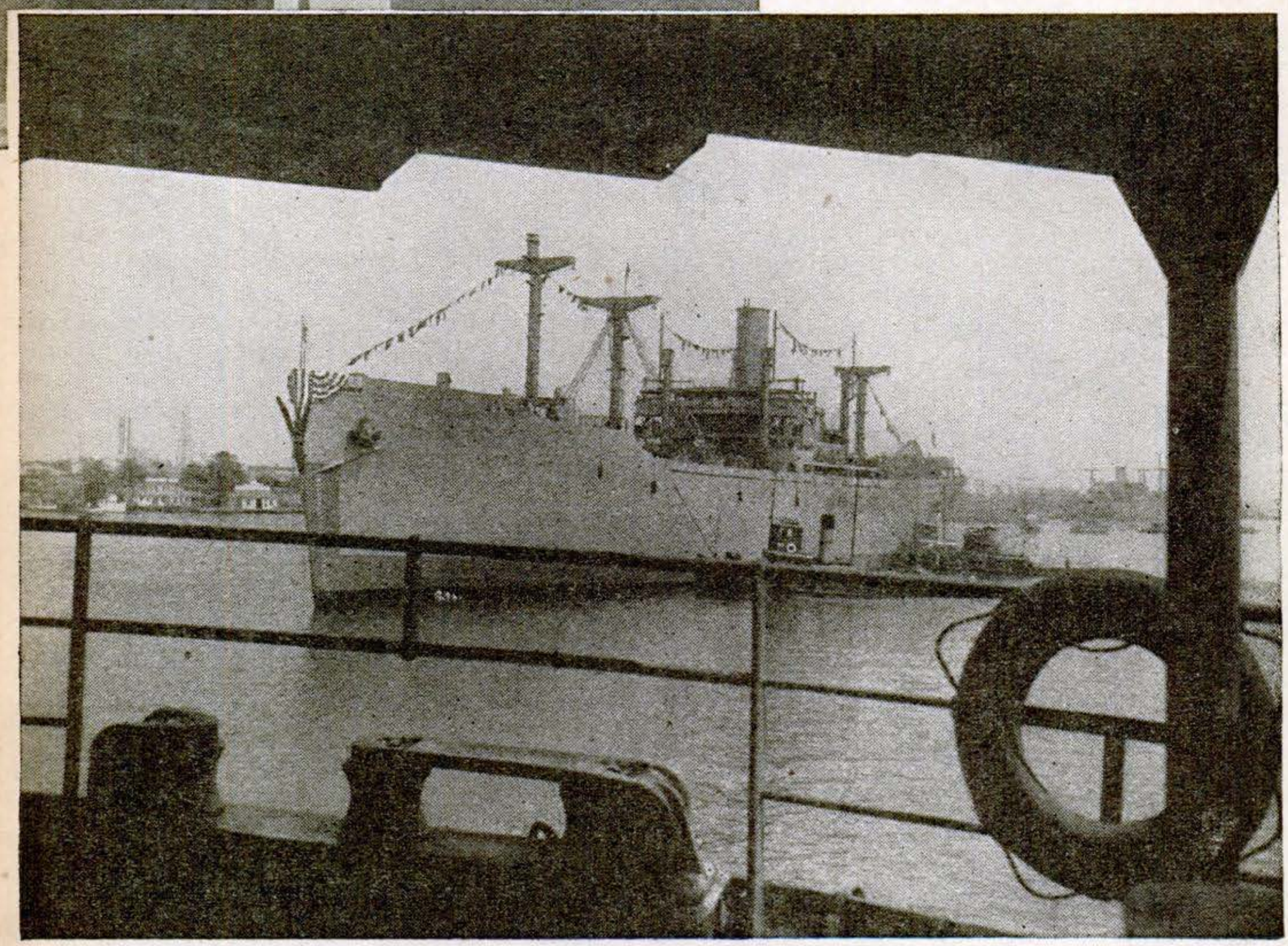
By RICHARD W. EMERY

*Photos by RAY CHAPIN*

ON EVERY movie set, there's a property man, called a "prop man" for short. He's there for a reason. Props will do for a picture what spice does for an apple pie. They give flavor and atmosphere—and punch. And props can do as much for your stills, whether they are taken indoors or outdoors.

The use of props in pictures is as old as art itself. Some of the most ancient drawings by prehistoric man found inscribed in stone show hunters shooting bows and arrows. The bows and arrows are props.

If you take a photo of Grandma knitting a shawl, the knitting needles and yarn are props, and



Without a life preserver and binoculars as props, the top photo would be little more than another shot of a bather. Below, a nautical foreground gives atmosphere and good composition to a picture of a ship.



Copyrighted material

# Atmosphere into Your Photos

so is her rocking chair. You can, of course, get a picture—and probably a good likeness — of Grandma without the knitting, but the props help to give it life, to put Grandma in a scene in which she characteristically appears. Those who know her best will most appreciate the picture, but the details will help characterize her to others.

Look at the setup before you take your next picture, and the chances are you will see many empty areas in the rectangle enclosed by the camera finder. Don't shoot until you have studied the situation for possible use of props. Maybe a footstool for Grandma's feet would help. A picture of Grandpa on the wall may square up a weak corner. Or it may be that moving the scene to a spot by the fireplace will provide an attractive old-fashioned background and give your photo atmosphere and character.

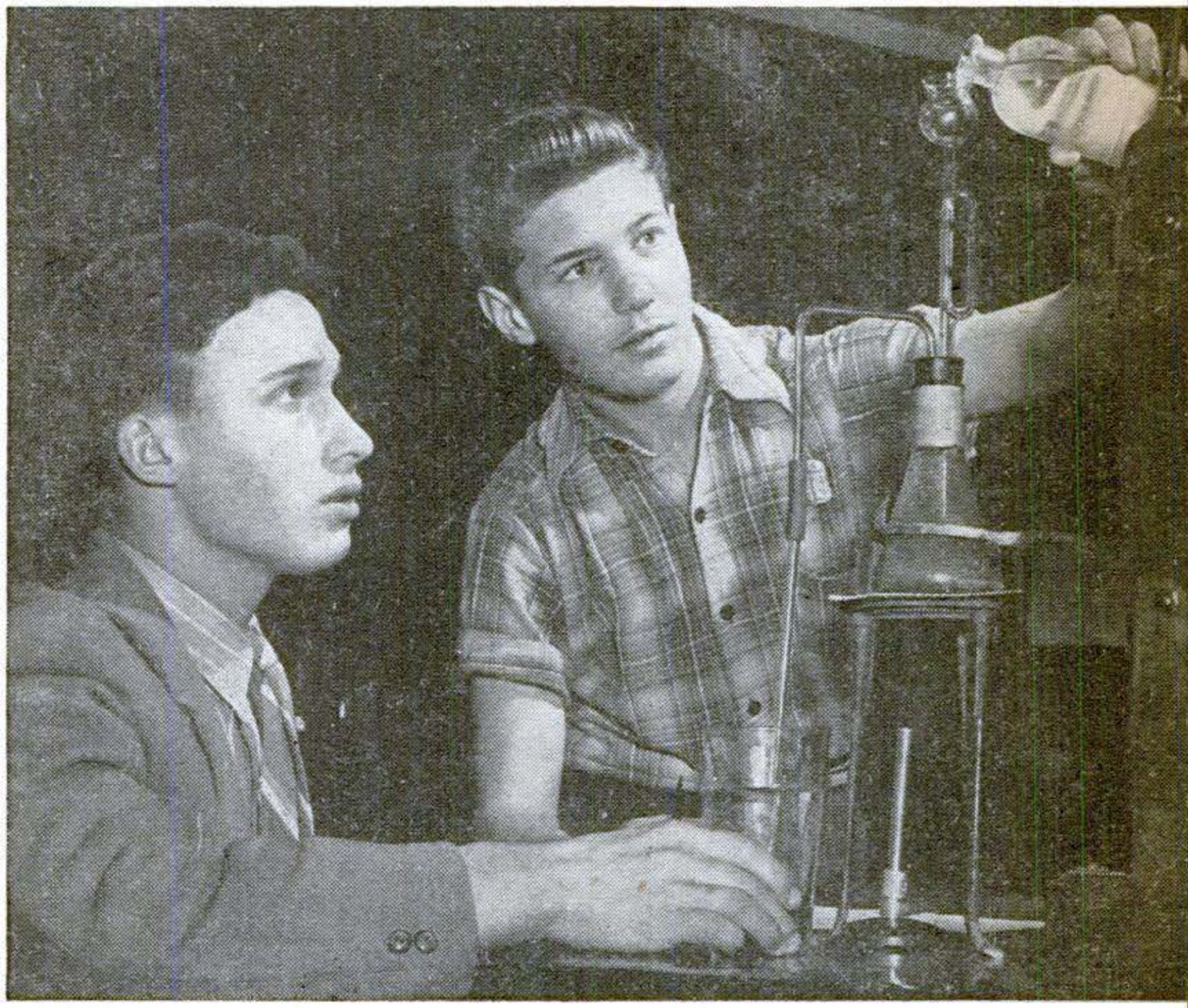


*Photo courtesy of Ford News Bureau*

Props that help show your subject in characteristic action add interest to a photograph. The chemistry apparatus above does the job effectively.

Through careful choice of props, you can make your photographs distinctive and different. Props can make a picture amusing or grim, whimsical or realistic. They set the stage for the theme of your photo, and a theme is what gives a photograph its kick. By taking a little time before your shoot, you can place props where they will help tell your story. You can pep up a trite subject and make it fresh and interesting. With a little imagination, you can find props that will help give your photographs a lot of action.

But remember that while props add to a picture, they cannot remove an objectionable background or foreground except by hiding the distracting elements. So before loading your setup with props, view the location with a critical eye, and choose a spot that helps express the theme and does not contain distracting elements that cannot be cut out or hidden.

Use props that harmonize with the central interest of your picture and remove those that don't. To cite an obvious example, if you are making a picture of a garage mechanic probing into the motor of a car, you would use such natural props as wrenches, hammers, and spark plugs.

Be logical. The setting for your picture, props and all, must be plausible. But you will be surprised how many props you can stuff in without making the finished picture look cluttered or overdressed.

Use props that will enable your subject or subjects to be doing something. Such action adds interest to the picture and helps put the subject at ease. Square up your picture with allied objects. If it is to show Aunt Effie in her rose garden, take her in the act of planting a new rose bush, give her a trowel to be using, and square up the corners with such things as a wheelbarrow, watering can, hoe, and rake.

Small props add interest to close-ups. One of a farmer, for instance, may be shot against a good rural background with a haystack, parts of a cornfield, or cattle showing, but watch for the little props. If it's in character, you may have the farmer chewing a straw, biting a chew off a plug



Copyrighted material

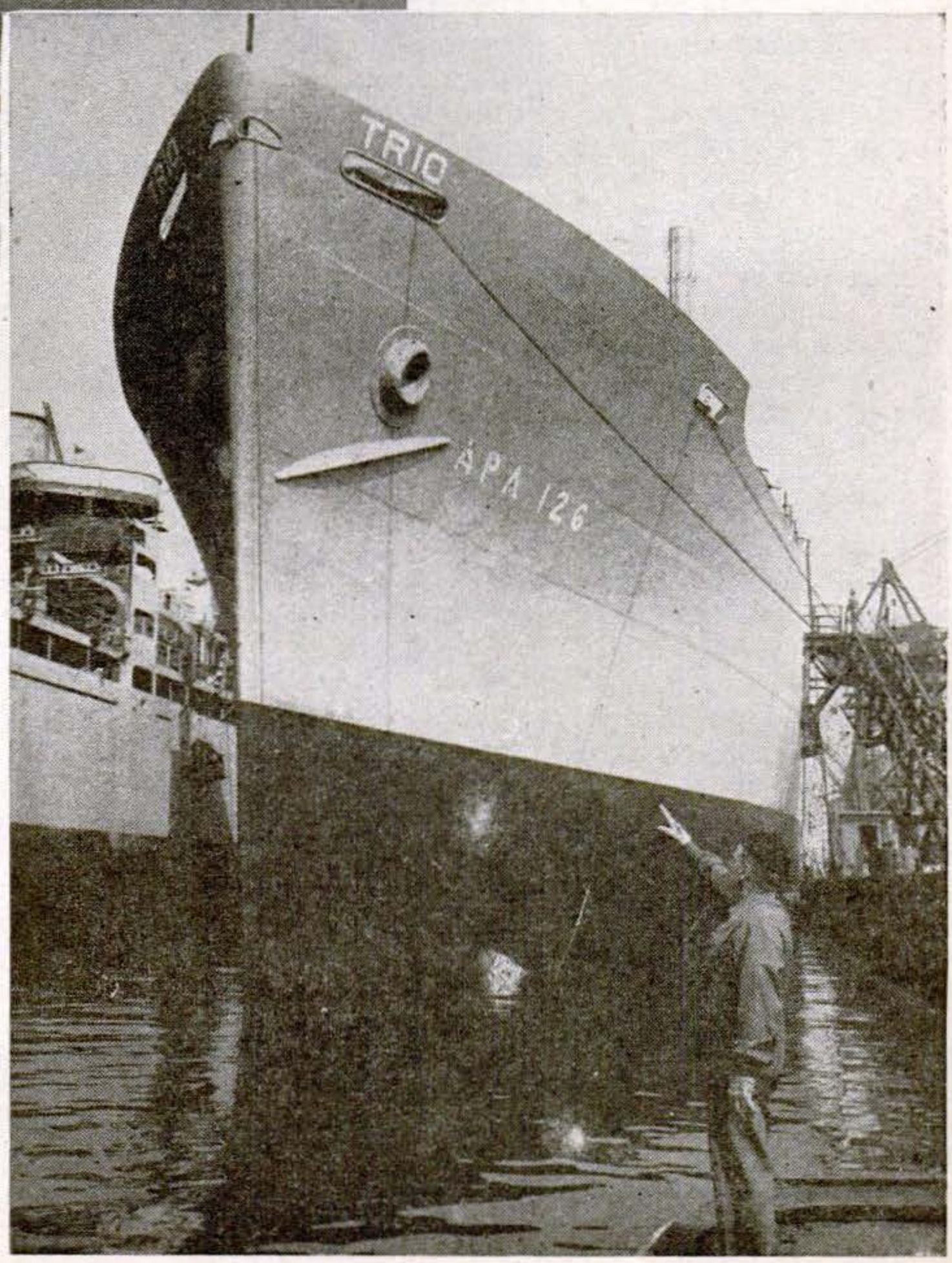
of tobacco, or intent on sharpening an ax. Watch for such little things as overall buckles, a straw hat or bandanna handkerchief, work gloves, or boots. But be sure to keep them in character with your subject.

Under certain conditions, people themselves can be used as the props. Most scenic photos gain when one or more persons can be seen somewhere in the picture.

You can use props to give size comparisons to subjects that alone might be deceiving. For example, a photo of a fish lying on a platter gives little clue to the size of the fish. It might be a small one on a small platter or a large one on a large platter. But a knife and fork in the picture will give a comparison.

One prop out of many may be accented for a second central interest. In a photo of Uncle Bill comfortably seated in his

Pretty girls and handsome horses make good pictures anywhere, but here a real Western interest has been added simply by inclusion of a weather-beaten gate.




People as well as things can sometimes be employed as props. That's the purpose of the person in the foreground in the photo at right. He adds interest and gives size comparison.



Copyrighted material

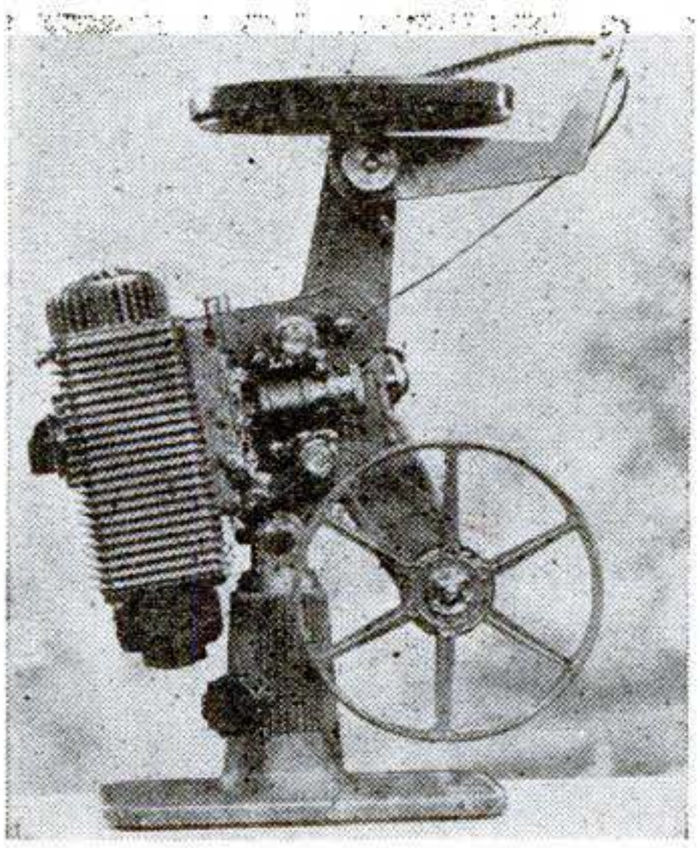
**How big were the fish you caught? A rod, hat, and knapsack give a fair comparison here · beyond dispute.**

favorite chair and oiling his trusty shotgun, the oilcan poised over the breech can be accented. The other props will be unaccented, but they will add atmosphere and interest.

Although the average picture can stand lots of props, their use can be overdone. Too many, especially too many prominent props, can overbalance the subject, which, after all, is the central interest. If a prop jumps out at you as you scan the setup through the finder, discard it. And in its place get one that won't steal the show.

There can be no book of rules on the use of props, for each particular picture calls for its own treatment. But, as already explained, there are many do's and don'ts. You are the doctor who must determine, for each individual case, how the props are to be employed most effectively, and what you do may make or break your photos.

## NEW PHOTO EQUIPMENT

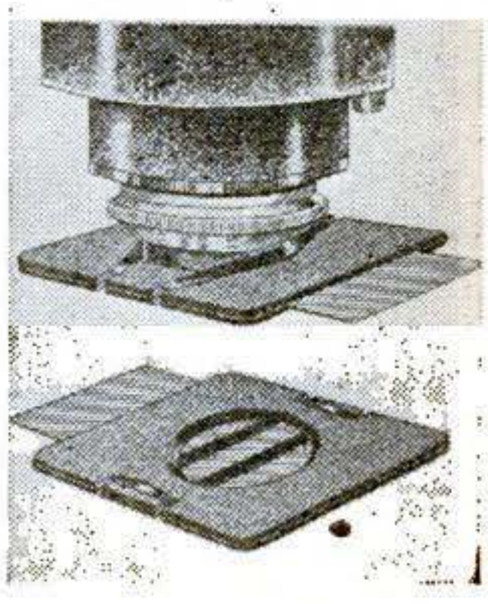


**REWINDING OF MOVIE FILM** once it has been shown becomes unnecessary when a new type of reel is used. Put on the market by the Motion Picture Equipment Company, of New York City, this nonrewinding reel set may be used with all types of movie projectors, either amateur or commercial. It consists of two identical reels with an attachment that will fit all 8- and 16-mm. silent and sound projectors, the film feeding from either the center or edge of the top reel.

In addition to the timesaving feature, the manufacturer claims that the set prevents wear on the film because there is no friction that could cause damage to the emulsion surface. The two reels in the set may be used in splicing, cleaning, and other operations in the same way as ordinary ones. Miguel Lopez-Henriquez, of the Motion Picture Equipment Company, invented the device.

**READINGS** are direct on this new shockproof exposure meter designed for indicating the correct diaphragm opening without calculations. The meter is set for both the desired shutter speed and the film used, and the pointer designates the *f* stop on an easy-reading scale. Over-all measurements are ⅞" by 2¾" by 3⅜" and the weight is 6 oz. The Hickok Electrical Instrument Company, of Cleveland, is the manufacturer of the handy little accessory.

**CONTROLLED DIFFUSION** in making enlargements is possible with a diffuser developed by the Spencer Company, of Mt. Vernon, N. Y. The degree of diffusion, to obtain desired effects, is varied by the amount the enlarger lens is covered by a diagonally lined transparent screen. This slides in a frame attached to the lens by means of a strong rubber band. In use the diffuser is attached to the enlarging lens after the negative is in place and the unit focused sharply, and it is then adjusted.



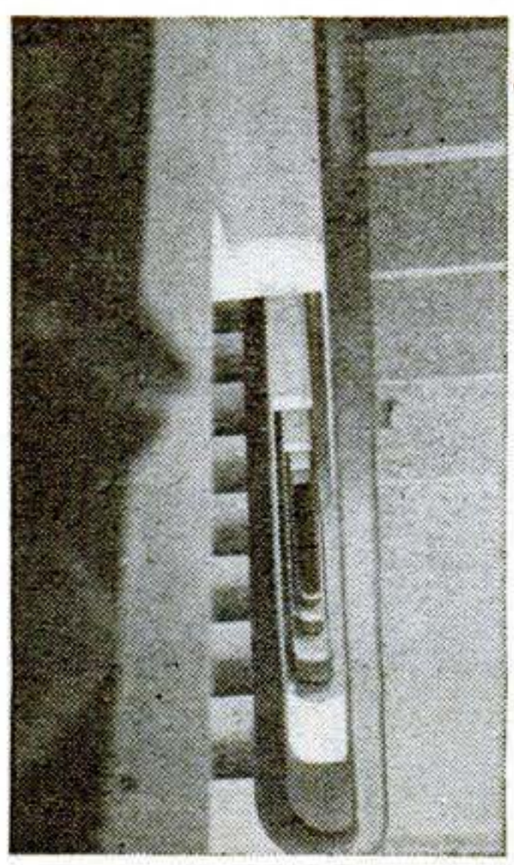


Copyrighted material

# CAN YOU BEAT THESE PICTURES?

*We will pay $5 for any photo used on this page. Write your name and address on each print. Enclose a stamped, self-addressed envelope and the negative, if it is available, and send your contribution to the Curious Photos Editor.*

**TRICK ROOM?** Well, maybe. The photo below was taken after an explosion in a candy firm's plant in Buffalo, N.Y. Chairs did a loop and landed on the ceiling, where they stuck in almost the same position they had occupied on the floor.



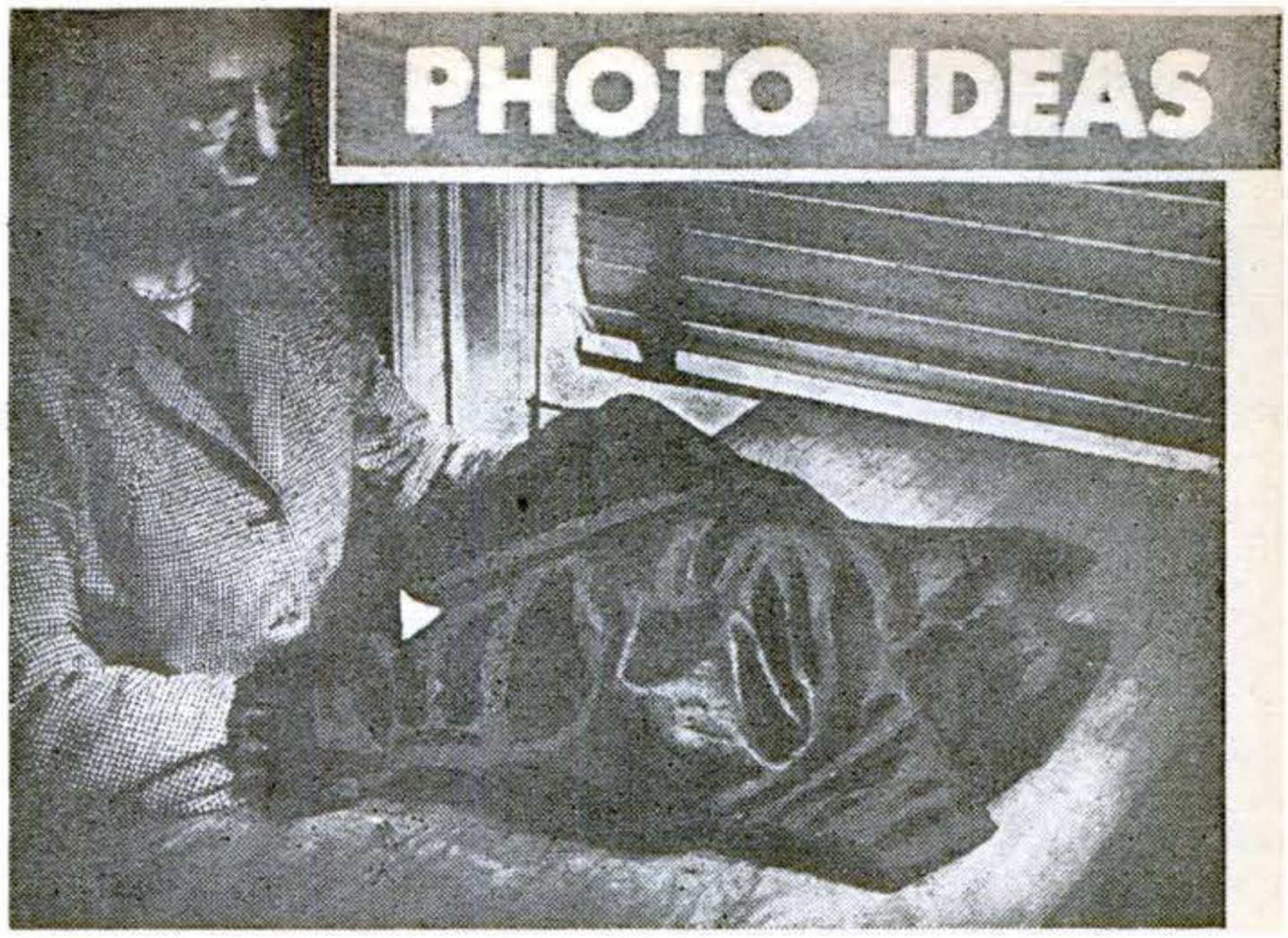
**DON'T GET DIZZY** as you look at the photo at left. But it's safer to suffer from vertigo while looking at the picture than it would have been for J. V. D. Saunders, of Clarksville, Tenn., when he made the shot. It's a view down a stair well from the fifth floor, and shows four different turns in the stairs down to the first floor.

"A stitch in time saves nine."

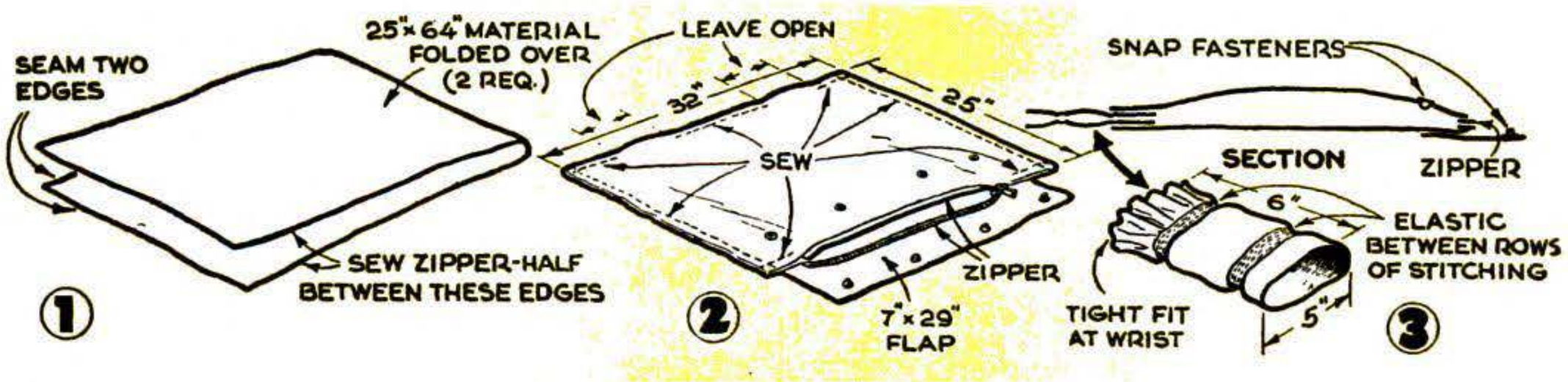
**PHOTO CHARADE.** This little lady is occupied with a task that forms the basis for an everyday expression. Do you know what that expression is? If you turn the page upside down and look closely at the fine print, you'll get it.

**TARGET SHOOTS AT B-17.** Tracer bullets are being blasted from .50-cal. guns in the turrets of the Flying Fortress shown below. The camera clicked just as one of the tracers hit a hard place in the revetment and ricocheted in a wide arc back over the big plane. Vernon T. Manion, of Seattle, was behind the camera.

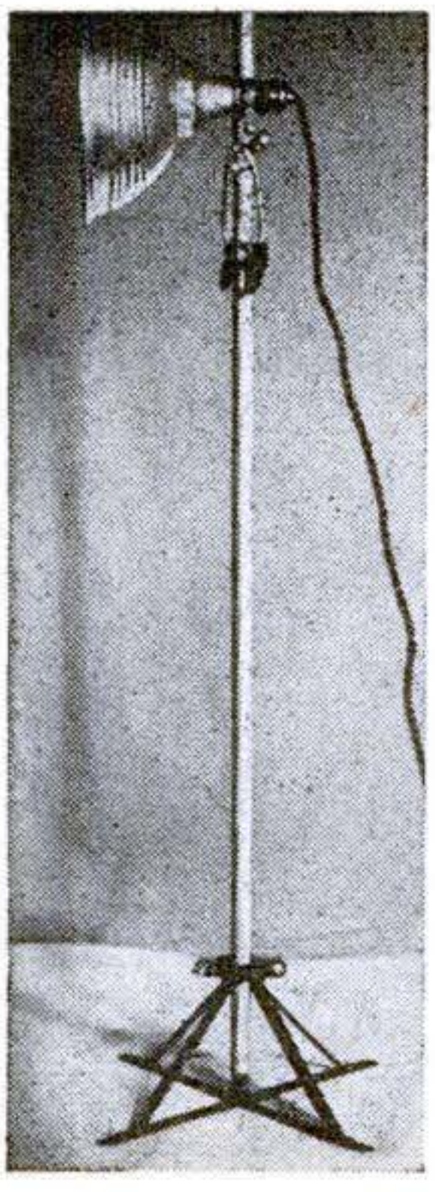
Copyrighted material



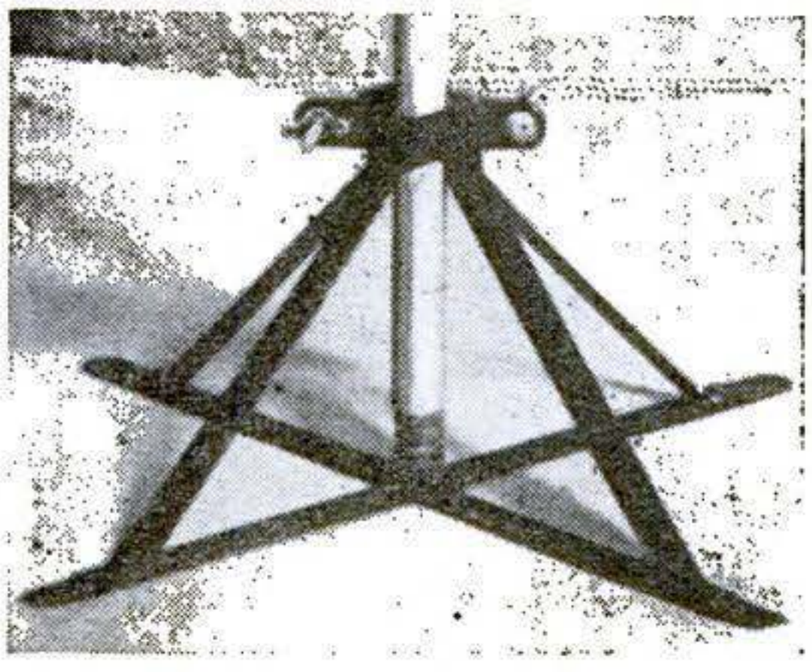
# PHOTO IDEAS

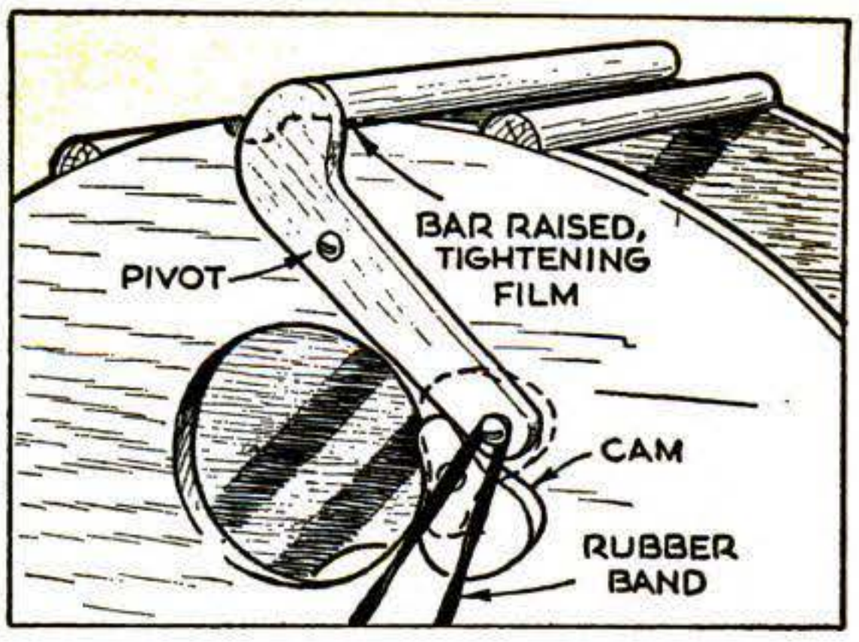



**CHANGING BAGS** are a convenience both at home and afield. They can be used at home for loading film into a developing tank and either at home or on photographic jaunts for loading cut-film holders. The bag above was made from a double thickness of black sateen, about 4 yd. of material being required. Make two sides, each of double thickness, as indicated in Fig. 1, seaming two of the open edges and sewing half of a zipper in the remaining open side. After the two halves are complete, sew them together as in Fig. 2, leaving two open spaces on the edge opposite the zipper for wristlets. Make the wristlets of a double thickness of sateen and stitch two elastics into each. Sew a flap to the zipper edge and attach snap fasteners as shown in Fig. 3.—F. C. SMITH.



**STANDS** to hold clamp-on reflectors can be devised in many ways, but one of the simplest consists of a broomstick or other piece of wood thrust into a metal Christmas-tree holder. A stand of this sort can be quickly rigged up, is light, and requires little storage space.—F. C. S.






**MOVIE FILM** is sometimes damaged if it stretches and loosens on a developing drum. Consequently, I removed a slat from my drum and replaced it with one that lifts, as above, to keep the film tight at all times. An elastic band provides tension when the cam is swung downward.—SIDNEY POTT.



Copyrighted material

# Improving

## SMALL THINGS CAN MAKE

By Tracy Diers

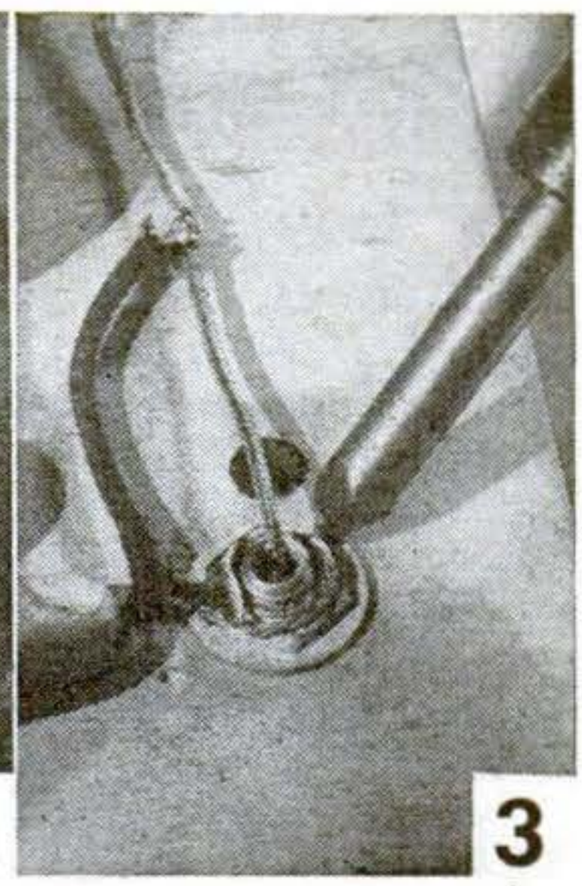
OWNERS of inexpensive record players often content themselves with lower standards of performance than they would like because of the belief that price and quality have to go hand in hand. Generally speaking, that's a sound rule, but it doesn't mean that the performance of such phonographs can't be improved.

Defects inherent in many players can be corrected at least in part. Among the most common faults are A. C. hum, motor vibrations, "wows," and distortion of high-volume passages.

While this article deals only with adjustments that can be made in the record player, a few things should be known about the amplifier with which it is used—in most cases the output stage of a home radio. Most important, of course, is the question of whether it is the radio that is causing the disturbing background hum. If your radio doesn't have a separate ground lead, it is probably of the voltage-doubler type and should not be grounded. In most cases, however, an amplifier or radio will be used that has a ground connection, and this should be securely connected

1

2

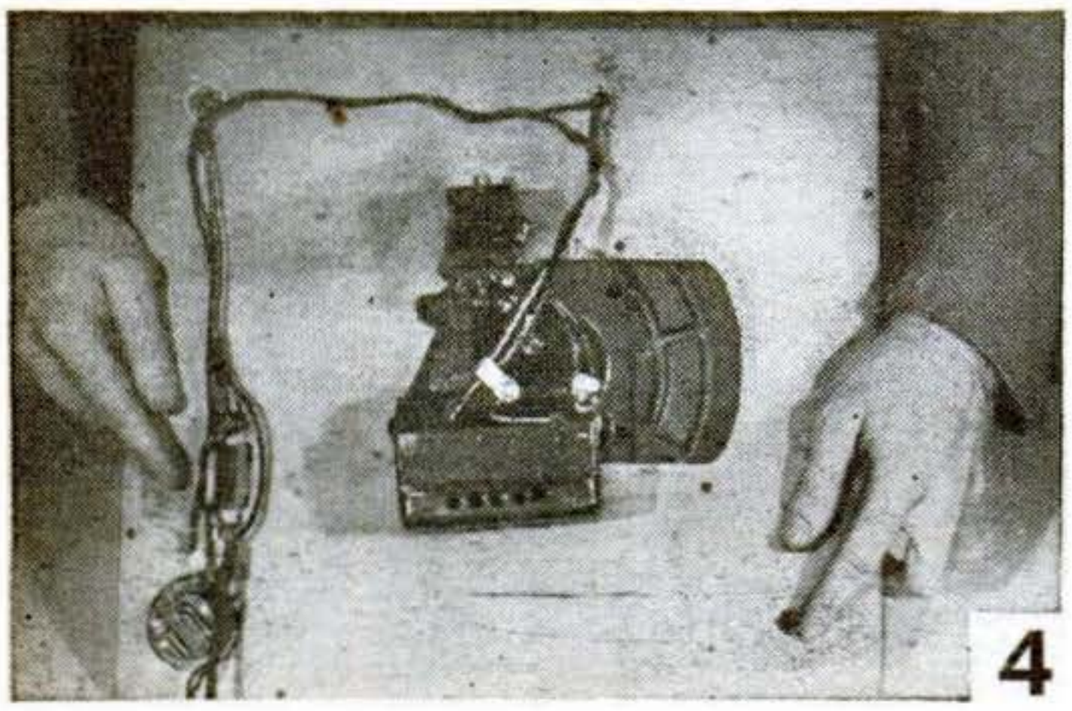


3

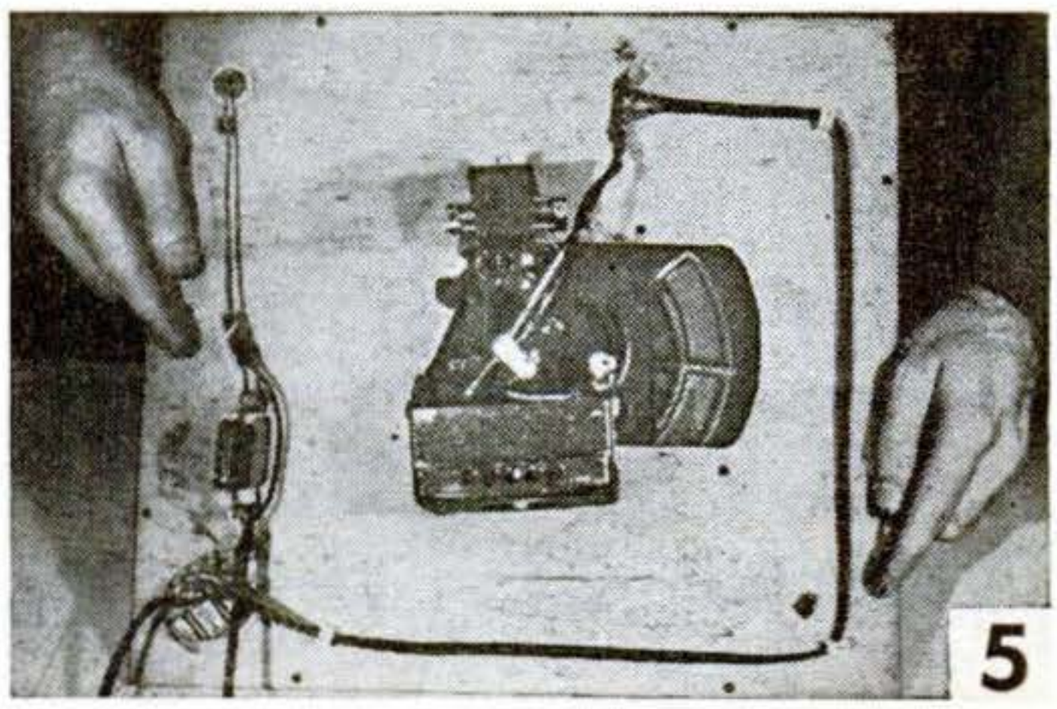
Before attempting to eliminate background hum from the record player, be sure that the trouble doesn't originate in the radio amplifier. A 100,000-ohm resistance will simulate the pickup impedance.

Good grounding is important to humless reception. If an ohmmeter test of the pickup case shows an imperfect ground, solder one end of a piece of wire to the holding nut, the other to the cable shield.

Hum may be caused by the A.C. field put out by the motor line cord. Separate it from the pickup cable.



4



5



Copyrighted material

# Low-Cost Record Players

## A BIG DIFFERENCE IN THE QUALITY OF YOUR PHONOGRAPH

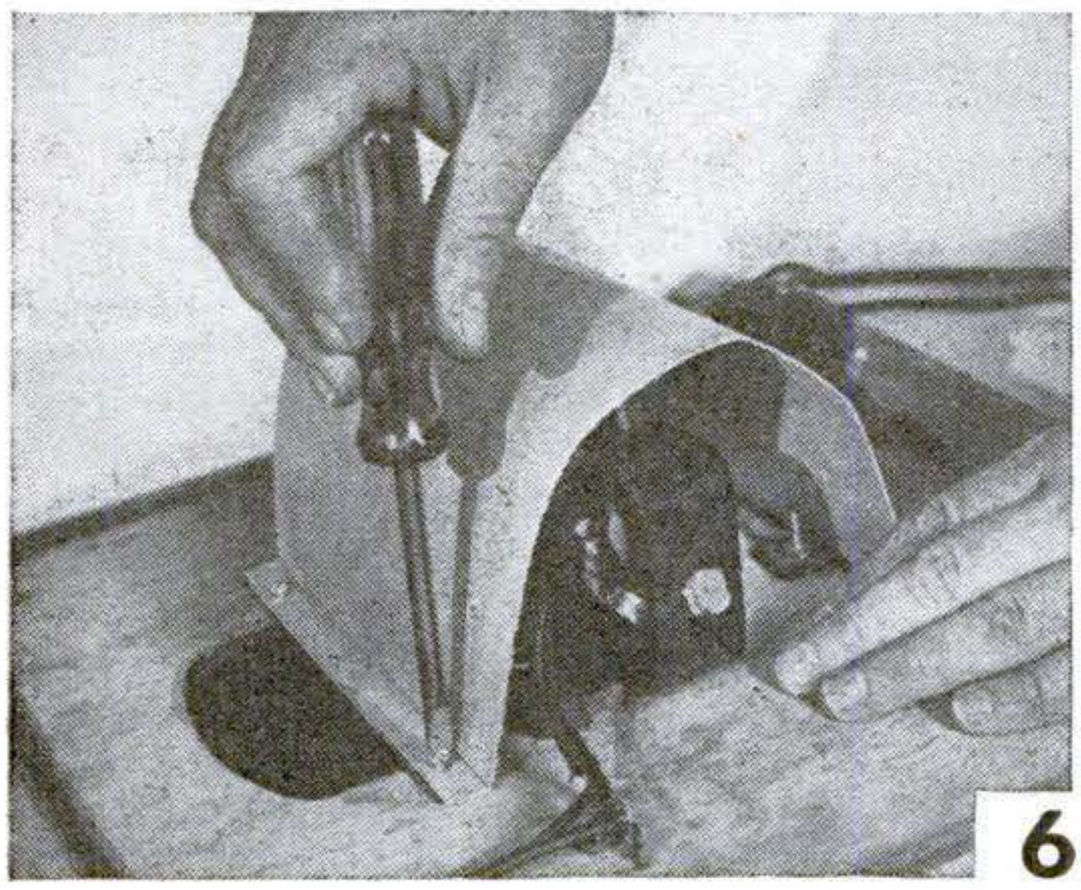
to a water pipe, steam radiator, or the like.

Remove the phonograph plug and replace it with a 100,000-ohm resistor to serve as a dummy load. Turn the volume up to the usual point and note the hum level. If it is very pronounced, then you must seek the trouble in your radio; if not, remove the resistor and reconnect the record player. With the motor turned off, but the volume up to its customary level, listen again for hum. Whatever increase you now hear may be put down to the record player. The trouble may be of either inductive or mechanical origin.

Connections between pickup and amplifier are one source of induced hum. If ordinary wire was used, replace it with shielded cable and ground the shield. To make sure that the pickup case is effectively grounded, touch one prod of an ohmmeter to the ground pipe and the other side to the pickup case (Fig. 2). A perfect ground will give a meter reading close to zero ohms; if it is higher, ground the case as shown in Fig. 3.

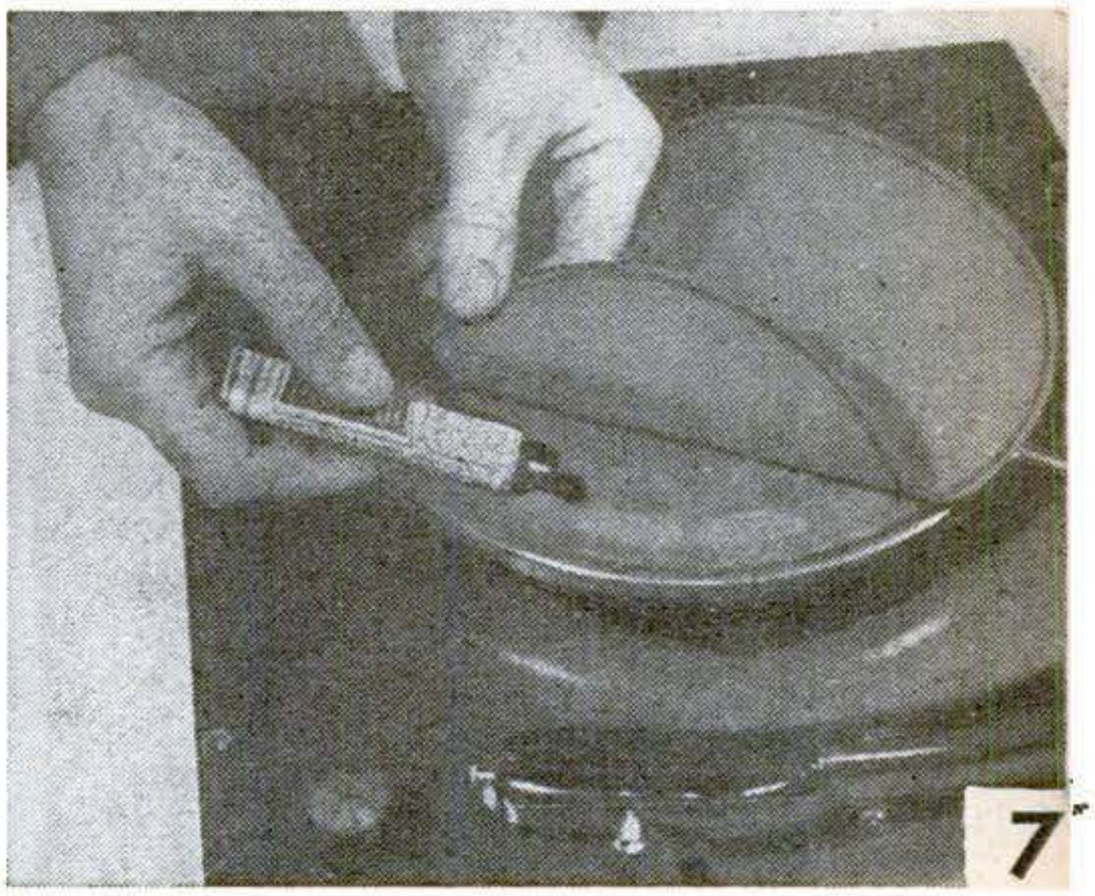
Now listen again for hum in the speaker, first with the motor off. As you turn it on, you should hear a click in the speaker, but no hum. If you do hear hum, reverse the line-cord plug.

Still no improvement? Perhaps the motor is putting out an A.C. field that is being picked up by the shielded cable. A motor line cord that runs parallel to the pickup cable (Fig. 4), should be separated as shown



6

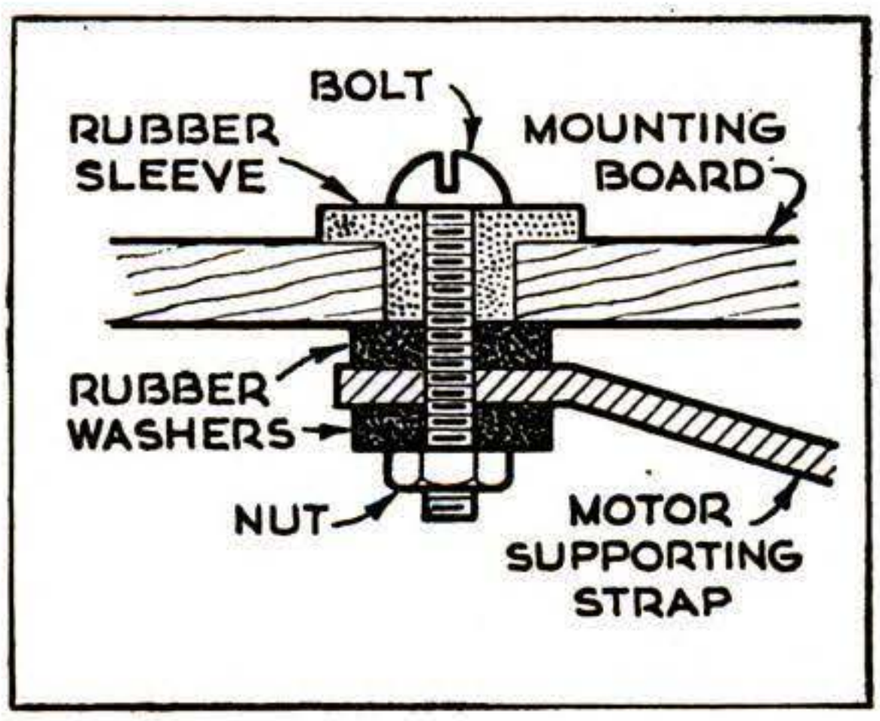
Sometimes the magnetic field set up by the motor persists even with all leads properly grounded. Should this happen, shield the motor with a thin sheet of any magnetic metal and ground the shield.

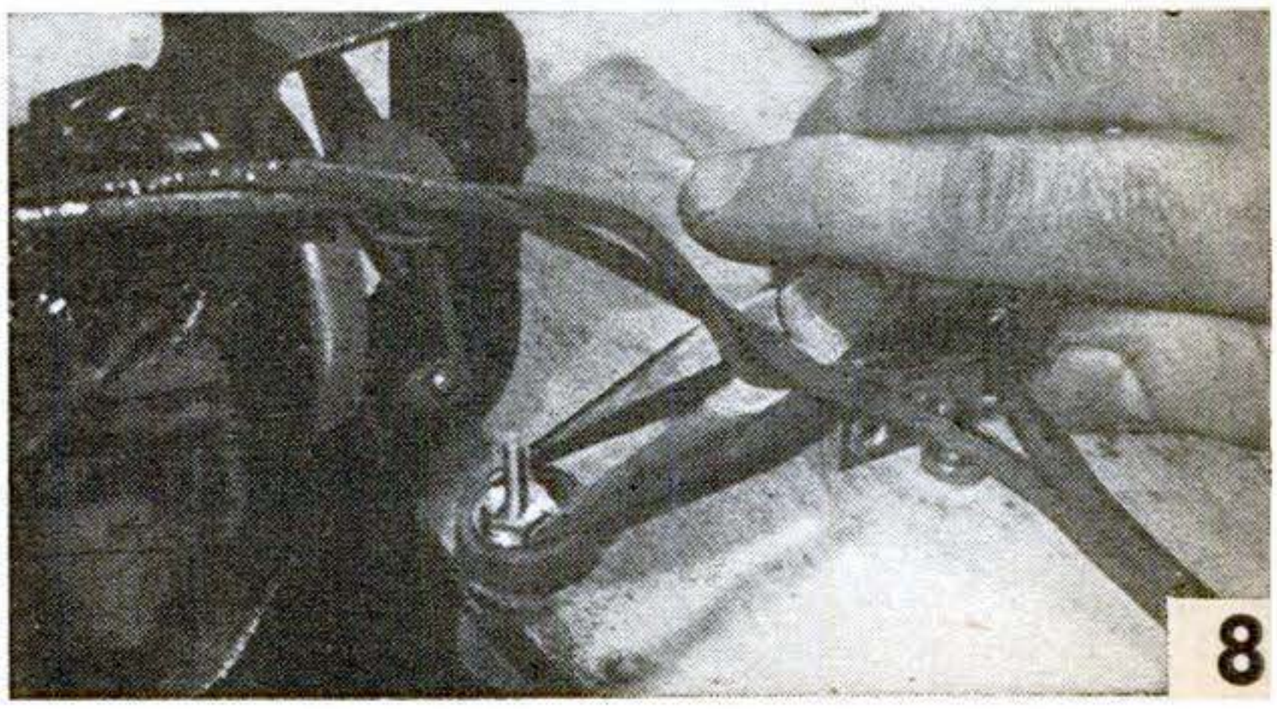


7

To eliminate mechanically caused hum, vibrations transmitted from the motor to the record must be damped somewhere along the line of travel. A piece of heavy felt glued to the turntable may help.

Used with the bolts that hold the motor to the mounting board, rubber sleeves will absorb some vibration.

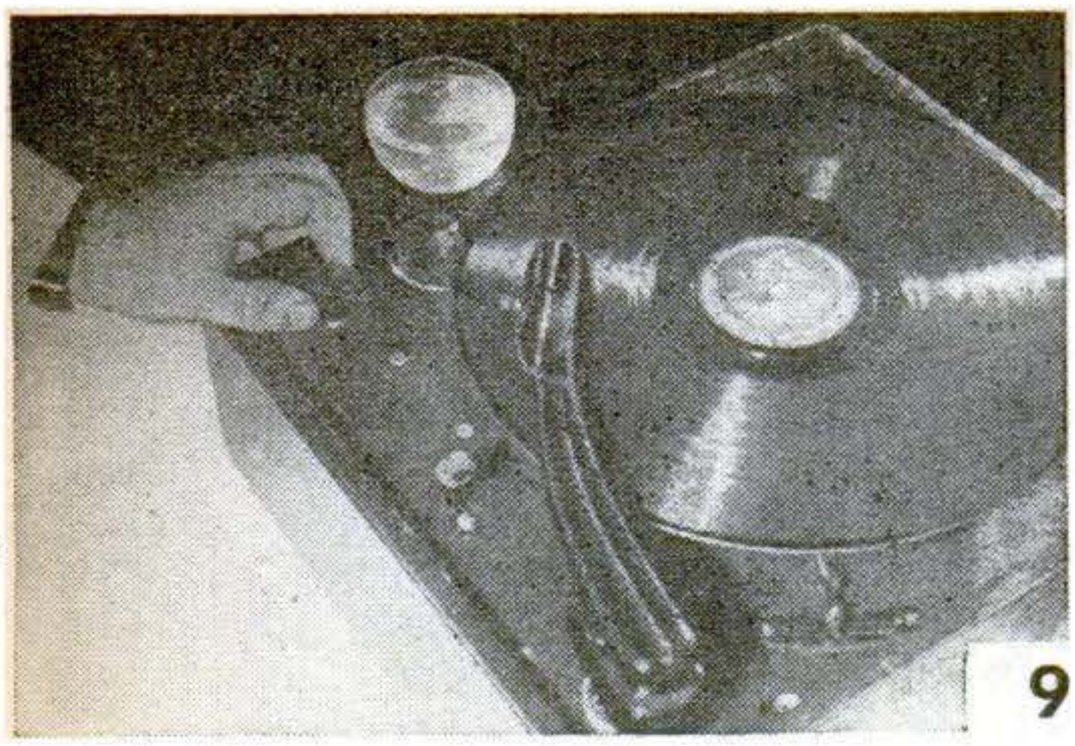


8



Copyrighted material



9

10

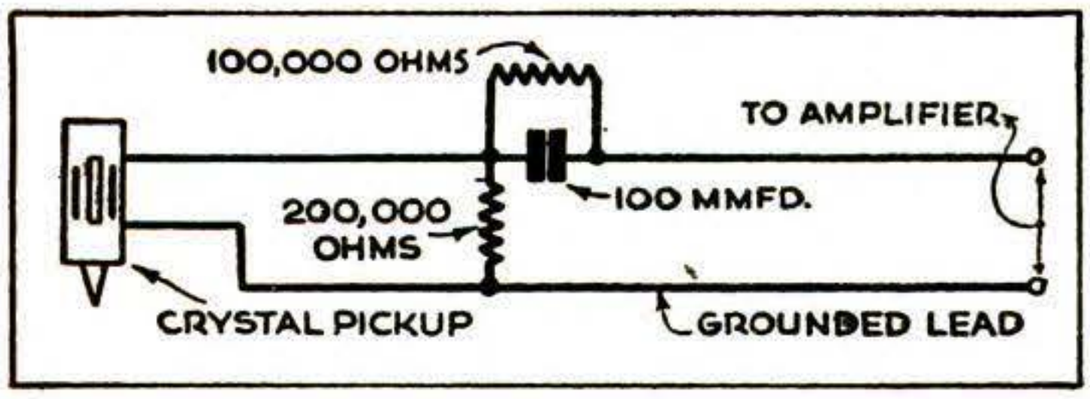
The water test, above, shows if motor vibrations are still being transmitted to the pickup. One common cause of "wows" is fluctuation in the line voltage. A voltmeter across the line (right) will show a dip or rise at the time the music quavers.

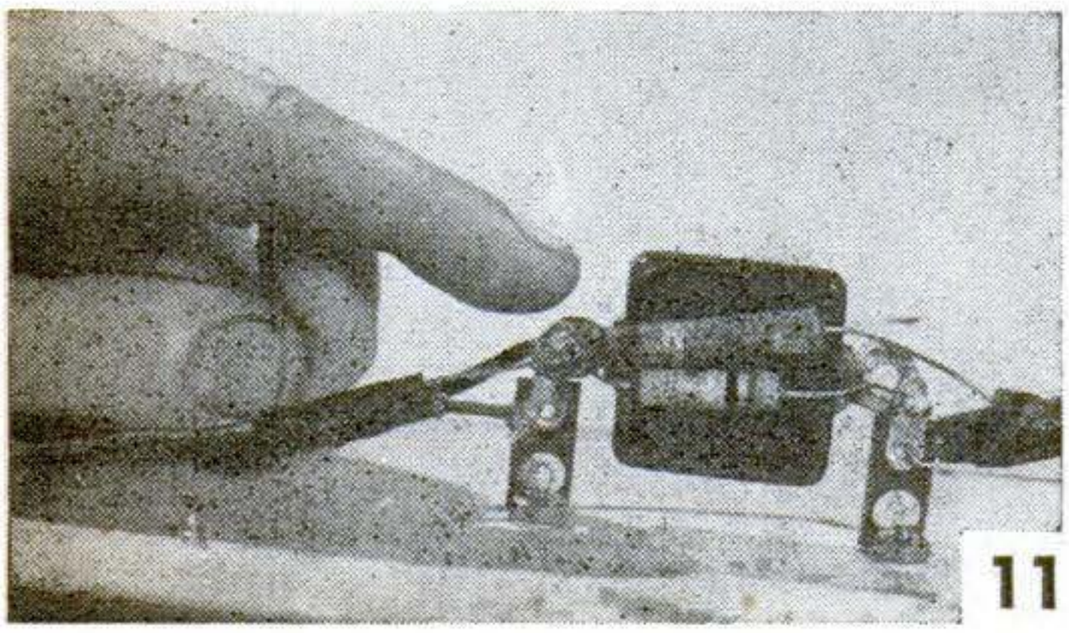
in Fig. 5. Better still, replace the line cord with a shielded two-conductor cable, and ground the shield.

Despite all these precautions, induced hum may still continue to ride through. One measure that still remains is to bend a sheet of iron or similar magnetic material around the motor as shown in Fig. 6.

There seems to be a perverse force in life that always manages to put the thing we're looking for at the bottom of the pile. So don't be too surprised if none of these improvements quite turns the trick. There's a pretty good chance that the trouble is not inductive at all, but mechanical.

Mechanically caused hum usually originates within the laminations of the motor itself, and works upward through the shaft to the spindle and turntable. Once in a while it is possible to eliminate the trouble by tightening the laminations. More often, it will require that the record be physically isolated from the vibrating motor and shaft.



11

Cement a piece of heavy felt over the turntable (Fig. 7), and place on it a record having a quiet or unmodulated section. With the needle in the quiet grooves, turn the gain up high. Any hum that can now be heard in addition to needle scratch may indicate that vibrations are being transmitted. Replacing the metal spindle with a rubber one should lessen this distortion. If it doesn't, you will have to sound-insulate the motor from the mounting board.

Use live-rubber sleeves and washers for the sound insulation. Discard old hardened washers, if any, and insert sleeves of at least ½" o.d. (Fig. 8). Do not draw the nuts so tight as to cancel the springiness of the rubber. To test for motor vibrations, use a glass of water as shown in Fig. 9; with the motor running, no ripples should appear on the surface.

Another common trouble found in inexpensive players is a malady known as "wows," caused when the turntable speed changes and introduces unpleasant quavers into sustained musical notes. Rooting out this defect completely might require a major rebuilding job, but the nuisance can be minimized if it happens to be caused by overloading of the line. Using the record player on a circuit on which you already have a refrigerator, oil burner, or other fair-sized load may mean that the player is subjected



Copyrighted material

to voltage fluctuations introduced into the line when this equipment is turned on and off by regular service demands.

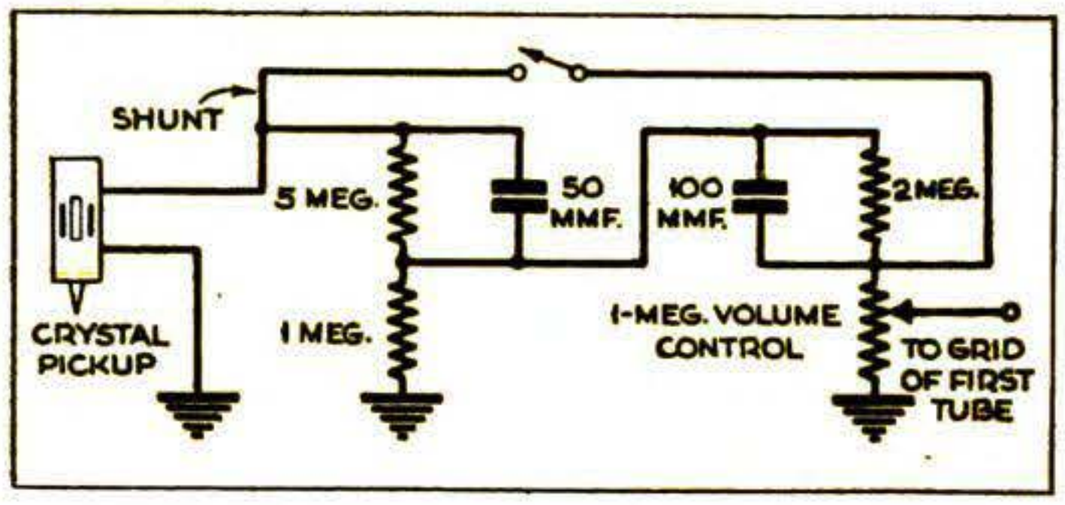
To check line fluctuations, connect a voltmeter across the record-player plug at the point where it enters the wall receptacle (Fig. 10). At the instant a "wow" occurs, the voltage may show a marked variation. Should this happen, try the record player on a less heavily loaded circuit.

Distortion of high-frequency sound passages results when a crystal pickup generates too high a voltage for the amplifier with which it is used. This defect, known as "blasting," can be remedied by the simple filter circuit shown with Fig. 11.

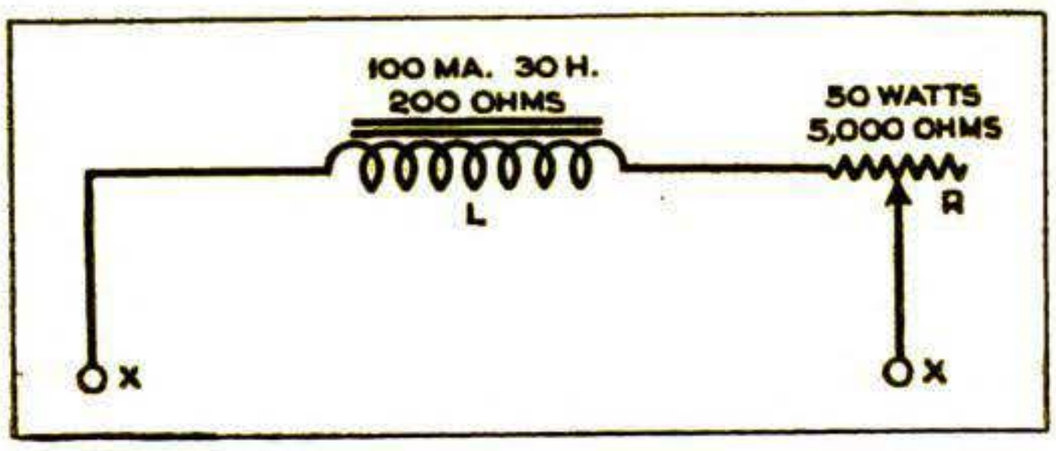
## Filter Increases Tonal Range of High-Fidelity Crystal Pickups

SOME of the newer phonographs feature pickups with excellent crystals and extremely light needle pressure. Used in conjunction with the vinylite-type records that practically eliminate needle scratch, it is possible to get the full tonal range actually recorded on the disks.

But because recordings are made with magnetic cutters and played back with crystal, a filter should be inserted in the pickup circuit to compensate for inherent differences in frequency characteristics between magnetic and crystal devices. The shunt is




used to disconnect the filter when old-style records—still the most common—are being played.—JOHN W. CAMPBELL, JR.

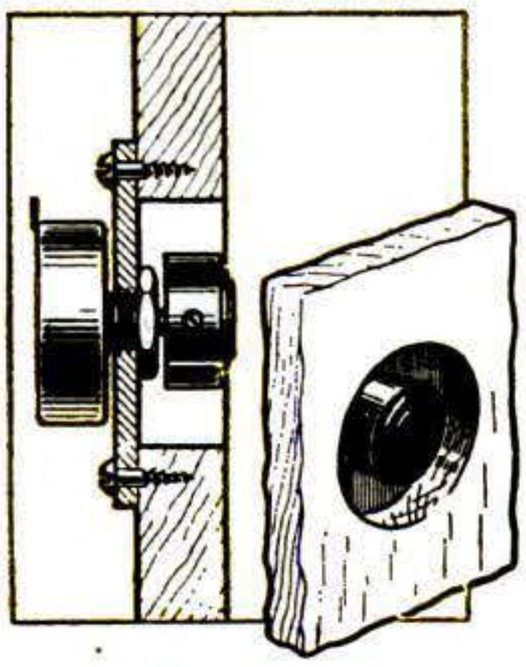



## Test Gives Field-Coil Resistance

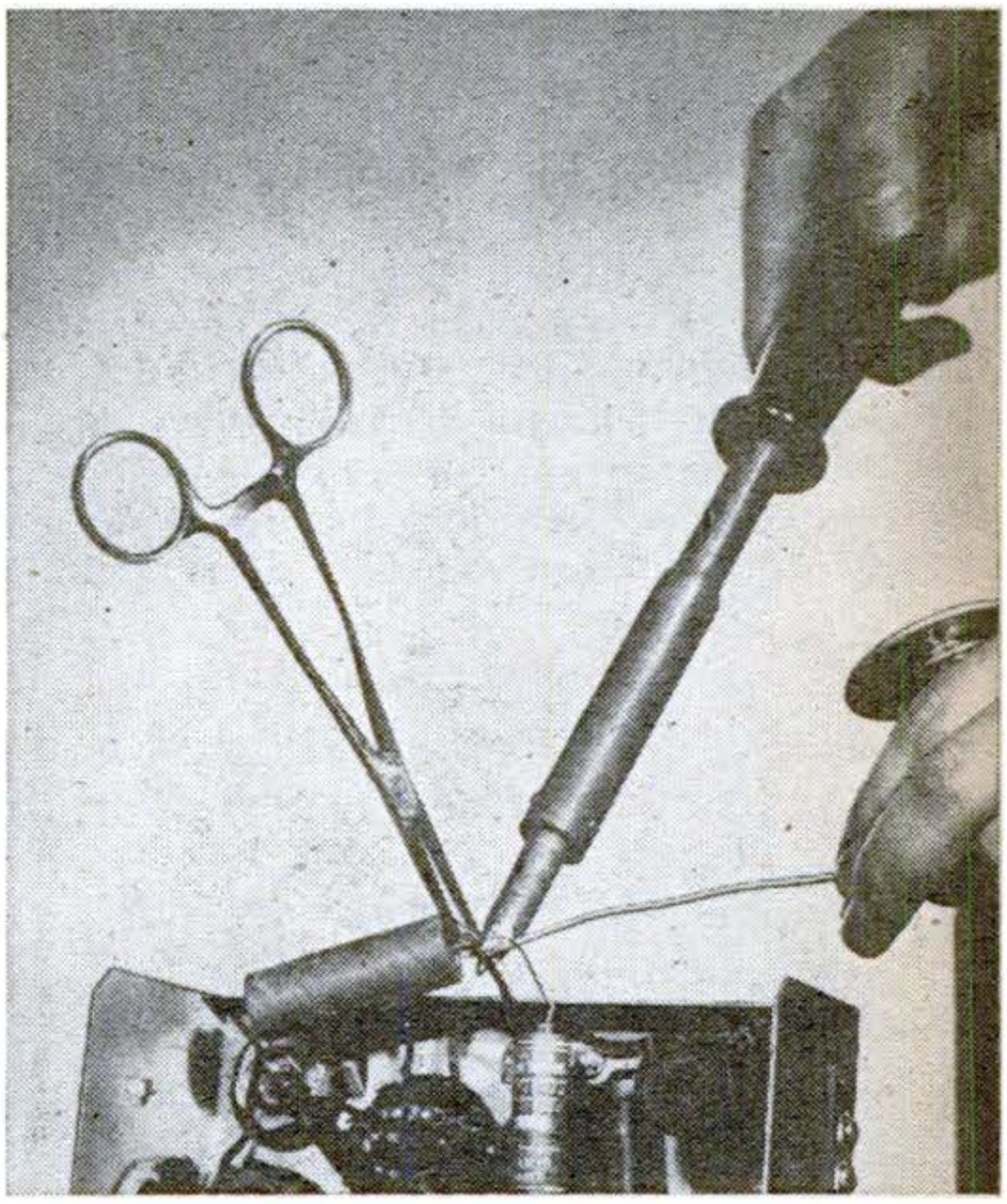
WHEN the resistance of a burned-out loudspeaker field coil is not marked on the original—as often happens—finding a replacement poses a problem for the serviceman. Connect a resistance in series with coil L, as shown above, across the field-coil terminals, and vary R until proper plate and screen voltages are observed. Turn off the power, and measure resistance $x$-$x$. Install a coil with the same value.—JACK KING.

## Knobs Protected by Recessing

FLUSH knobs on a portable radio or phonograph case can be fitted by cutting suitably sized holes in a thick panel and mounting the controls on composition-board sheets screwed on behind. Knobs in this position cannot interfere with the closing of tight-fitting covers.—G. O. S.



## Surgical Instrument Serves as "Third Hand" for Serviceman

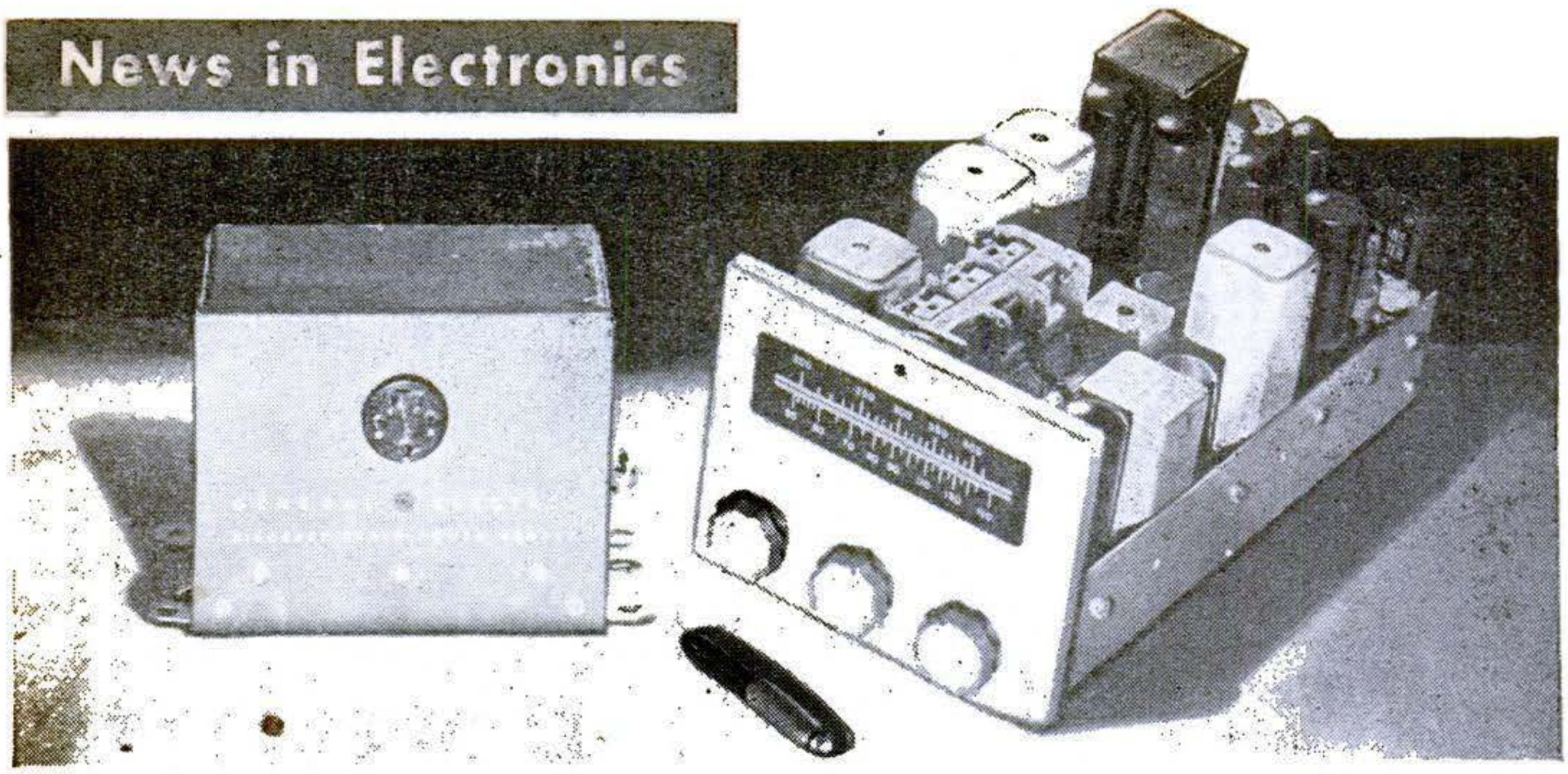


TEMPERED steel forceps that can be made to lock in one of several positions are particularly useful for holding wires or small parts in place while both hands are used for soldering. Slightly damaged or worn hemostatic forceps of the type illustrated above are available at many secondhand stores. Metal shims may be soldered to the blades to allow the right pressure for frequently repeated operations.—H. LEEPER.



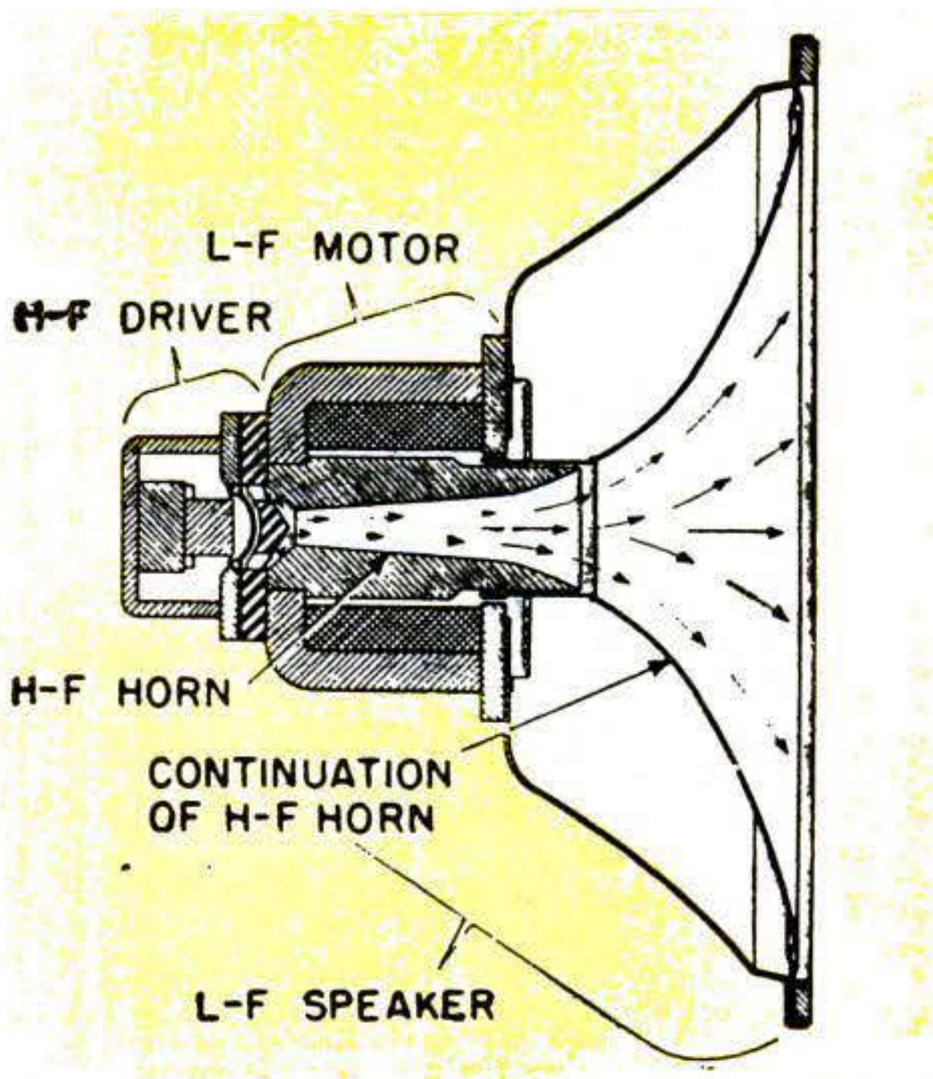
Copyrighted material

# News in Electronics

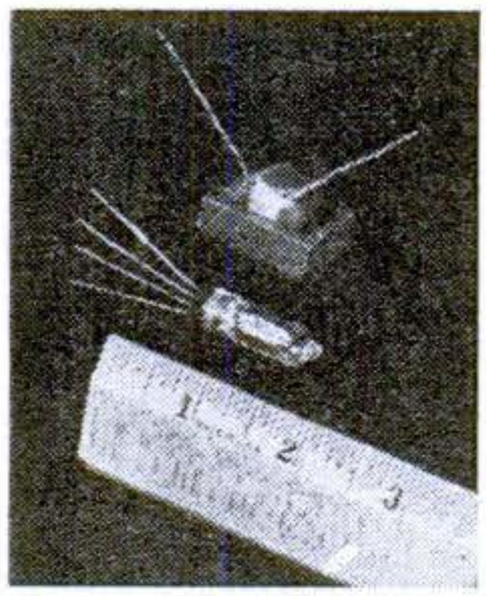


**PERSONAL PLANE RADIOS** are now being readied for purchasers of private planes. Illustrated above is a receiver-transmitter made by General Electric for communication with tower and radio-range stations, and designed to operate directly from a 12-volt airplane battery. Similar instruments of both receiver and transceiver type have been announced by other manufacturers, including Bendix, Lear, Macguire, and Ranger. All of them feature compactness and low battery drain.

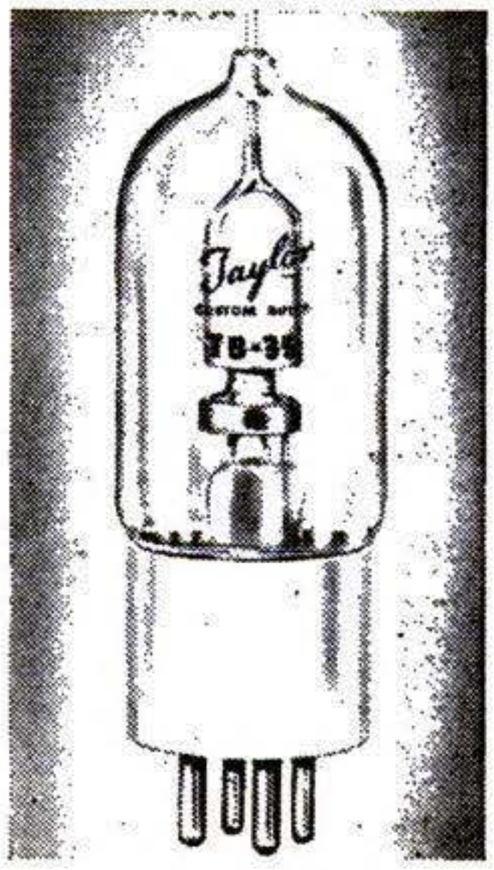
**FULL FREQUENCY RESPONSE** formerly required the use of two speakers, one specially adapted to reproducing the low notes, and the other the highs. These two functions are now performed by a single unit of the type shown below. Called the Coaxial speaker, and made by the Jensen Radio Manufacturing Co., of Chicago, this instrument is designed to give better control of the objectionable resonances in the "crossover region" where both speakers are operating. It also equalizes sound radiation.




**MATCHING** the almost microscopic size of hearing-aid tubes, this choke coil has a regular laminated core, and is assembled in the same way as the larger, more familiar type used in radio receivers. Low power requirements of the minute tubes permit the design of tiny but efficient components. Originally made on special order only, chokes of this size are becoming generally available.



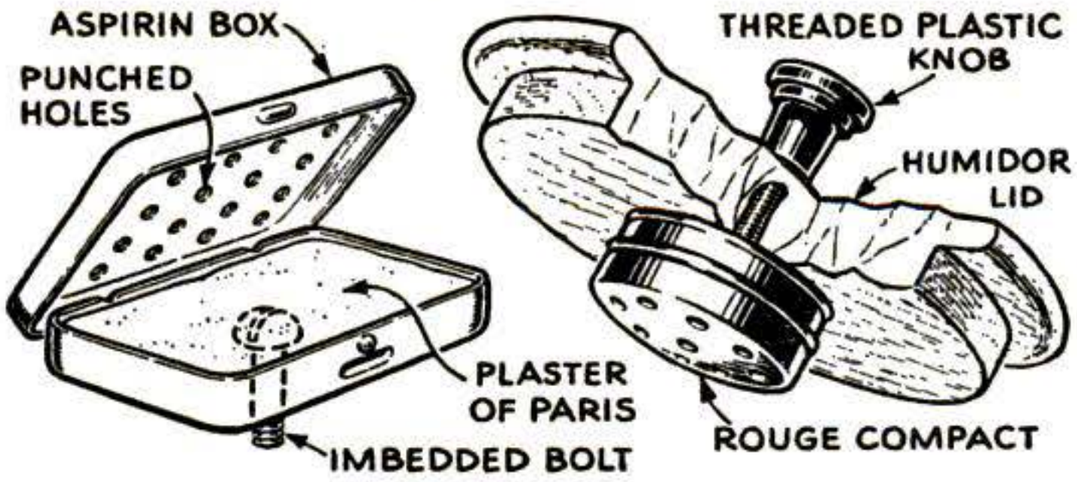
**VHF AND UHF** operation, being relatively new and unexplored, has been hampered by a shortage of standard equipment. Filling in one gap is the TB-35 beam tetrode shown at the right. It is made by Taylor Tubes, Inc., of Chicago, and is designed to deliver 130 watts of output power at 250 mc. and about half as much when operated up to 400 mc.



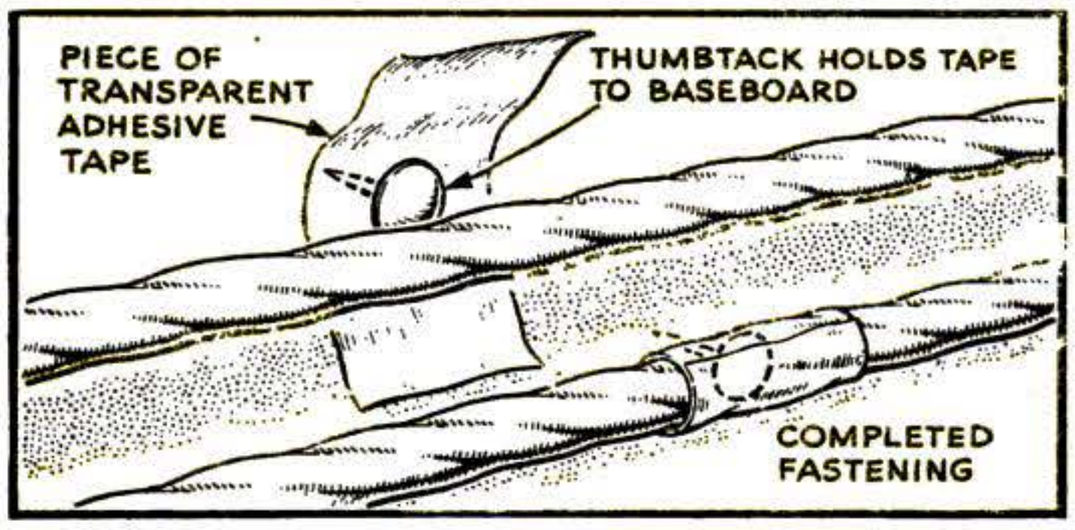



Copyrighted material

## Plaster Keeps Tobacco Moist

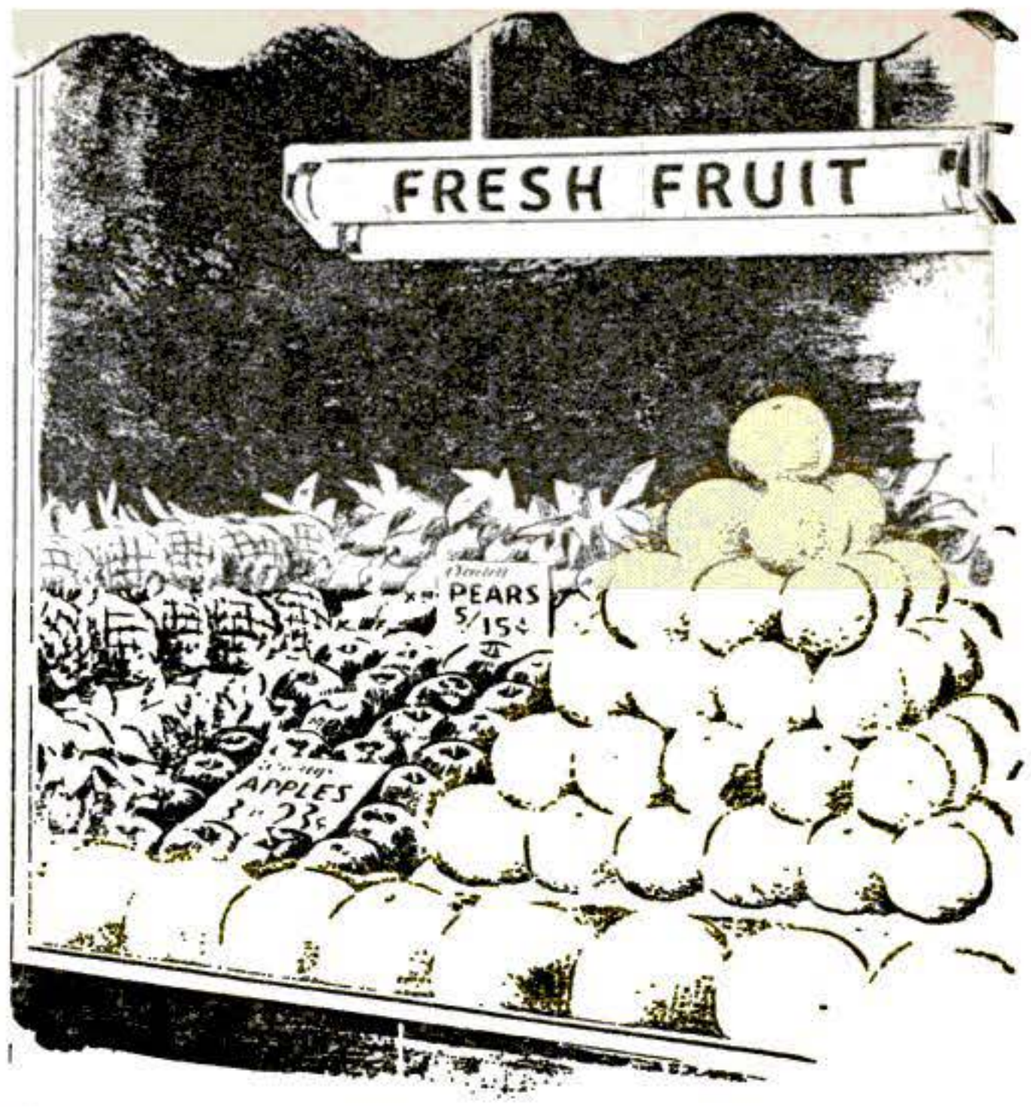



ANY small plastic or metal container can be used as a tobacco moistener simply by adding moisture-retaining plaster of Paris. Paint the box or rub it with steel wool, punch holes in top and sides, fill with plaster, and add water. The water should be replenished every few weeks.—G. E. H.




## Invisible Tape Fastens Wires

WIRE fastenings can be made almost invisible by the method illustrated above. Tack 1½" strips of cellulose tape to the baseboard at appropriate intervals. Leave the gummed side out, and wrap the tape tightly around the wire.—JOHN A. VINCENTI.




## Fluorescent Lamps Double As Illuminated Signs or Markers

MERCHANTS and householders who are planning the installation of fluorescent lighting fixtures may want to consider the possibility of putting the lamps to double use. Enameled lettering on the tubes, as in the suggestion illustrated above, makes convenient department markers in stores. Used in the same way, they can add to a window display.

Residential applications are more limited, but when the position of the lights permits they may be used as address or name plates, or professional or business shingles, or the like.—FRANK SHORE.

## GREEK ALPHABET [STANDARD SYMBOLS]

| Name | Capital Letter | Small Letter | Used to Designate |
|---|---|---|---|
| Alpha | Α | α | Angles. Area. Coefficients. |
| Beta | Β | β | Angles. Flux density. Coefficients. |
| Gamma | Γ | γ | Conductivity. Specific gravity. |
| Delta | Δ | δ | Variation. Density. |
| Epsilon | Ε | ε | Base of natural logarithms. |
| Zeta | Ζ | ζ | Impedance. Coefficients. Coordinates. |
| Eta | Η | η | Hysteresis coefficient. Efficiency. |
| Theta | Θ | θ | Temperature. Phase angle. |
| Iota | Ι | ι | |
| Kappa | Κ | κ | Dielectric constant. Susceptibility. |
| Lambda | Λ | λ | Wave length. |
| Mu | Μ | μ | Micro (millionth). Amplification factor. Permeability. |
| Nu | Ν | ν | Reluctivity |
| Xi | Ξ | ξ | |
| Omicron | Ο | ο | |
| Pi | Π | π | Ratio of circumference to diameter=3.1416. |
| Rho | Ρ | ρ | Resistivity. |
| Sigma | Σ | σ | Sign of summation. |
| Tau | Τ | τ | Time constant. Time phase displacement. |
| Upsilon | Υ | υ | |
| Phi | Φ | φ | Magnetic flux. Angles. |
| Chi | Χ | χ | |
| Psi | Ψ | ψ | Dielectric flux. Phase difference. |
| Omega | Ω | ω | Capital letter, ohms. Small letter, angular velocity. |

A RADIO tube with a whosis of 12, and a whatsis of 3,000, is probably pretty good, but it's hard to be sure.

Greek letters are constantly popping up in scientific and technical writing, and many people have trouble remembering what they stand for because they are usually used without explanation. If you've been calling the symbol for phase angle "Joe," it's time to get acquainted with "Theta." All the other Greek letters, and some of the things they commonly refer to, are given in the table at the left.

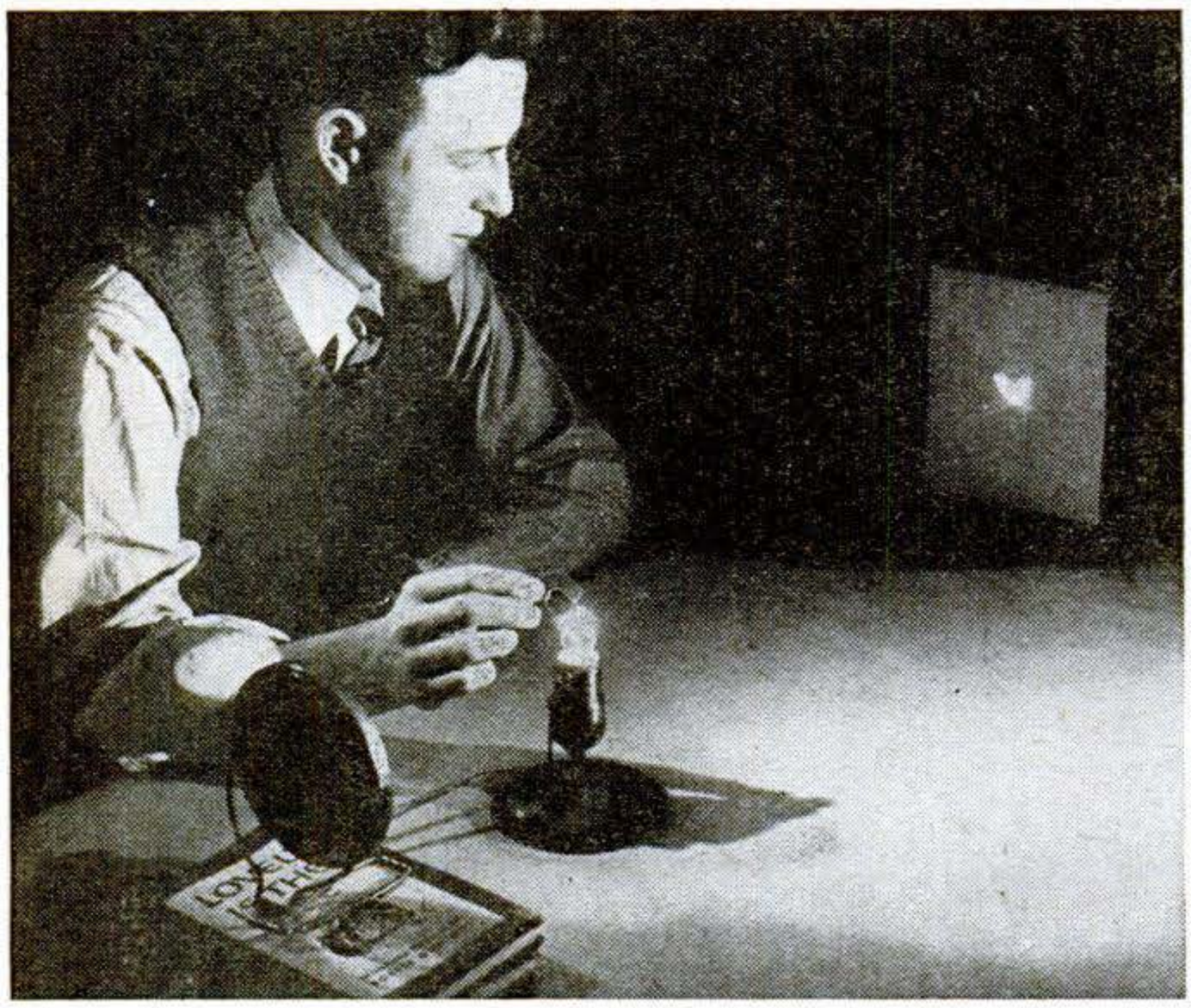
POPULAR SCIENCE MONTHLY SHOP DATA



Copyrighted material

# HOME EXPERIMENTS CURIOUS

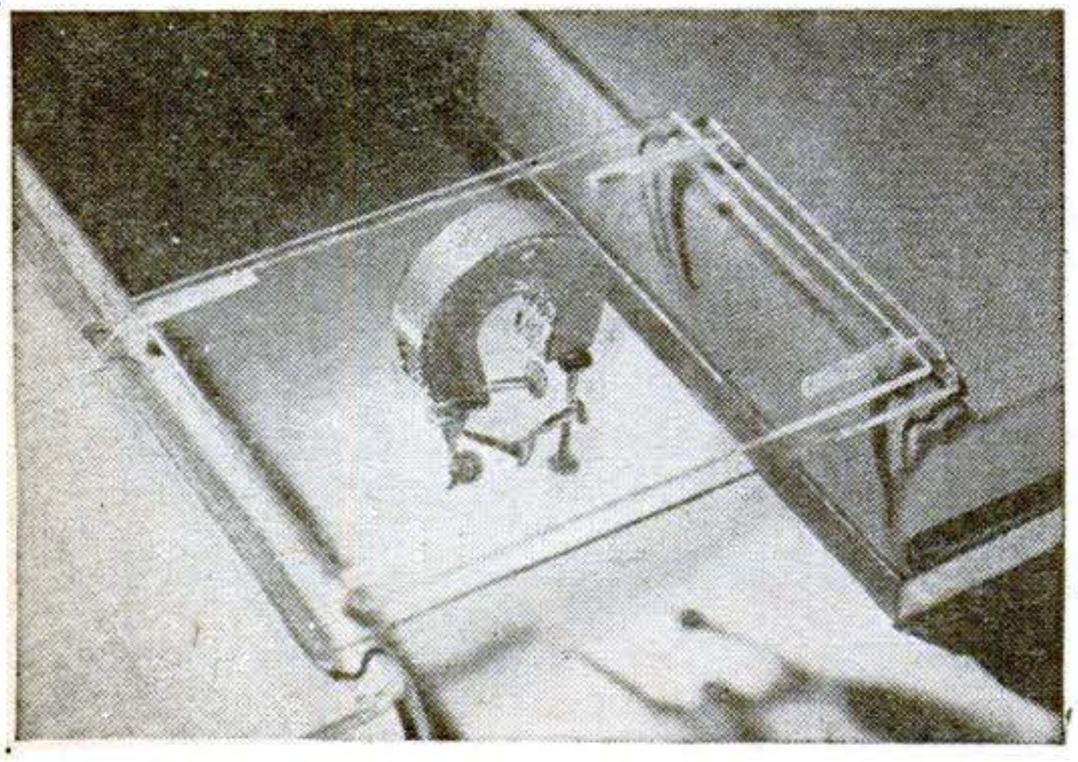
ALNICO magnets open up new fields for the home experimenter, for they are far stronger than ordinary steel magnets of equal size. They are so powerful, in fact, that one, in a special assembly, has been recorded as lifting 4,450 times its own weight. During the war these supermagnets were under high priority, but they now are again available to civilians, and two small ones will serve for the following experiments. Alnico is the trade name for a hard and brittle alloy of aluminum, nickel, cobalt, and iron. Because of their strength, these magnets are used in place of electromagnets.

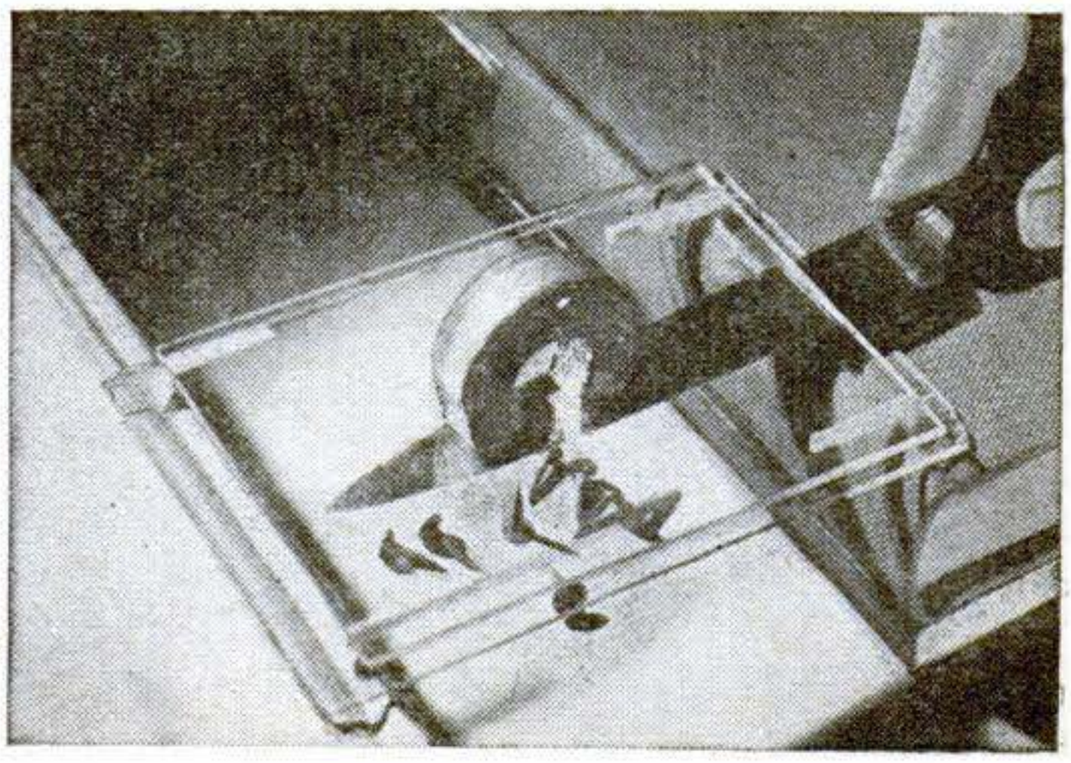


**MAGNETIC FIELDS** surround all electrical conductors. In the case of alternating current, the field rises and falls and reverses its polarity with the alterations of current. You can show this by adjusting a magnifying shaving mirror and a sheet of white paper on opposite sides of a clear 115-volt bulb until the image of the bulb filament is in sharp focus and enlarged on the paper. If you now bring a magnet near the lighted bulb, the filament image will begin to vibrate. The closer the magnet approaches, the stronger the vibration becomes. The explanation: as the field reverses its polarity, the filament is alternately attracted and repelled.

**MAGNETIC LINES OF FORCE** pass freely through nonmagnetic materials, whether they are conductors or nonconductors of electricity. To demonstrate this, separate two plates of glass with matchsticks, so that there is a slight air space, and arrange them between two books like a bridge, as below. Then strew several tacks under the bridge and stand an alnico horseshoe magnet, poles down, on the upper glass. Even though two thicknesses of glass and a layer of air intervene, the magnet immediately draws the tacks against the underside of the lower glass.

You can now use the same setup to show that magnetic materials, such as iron or steel, act as a barrier to the lines of force from a magnet and cause the field to withdraw. Leave the magnet and tacks in place, and insert the blade of a carbon-steel knife between the sheets of glass, directly beneath the magnet. As the blade comes between the magnet and tacks, it intercepts the powerful magnetic field, and the tacks fall off.

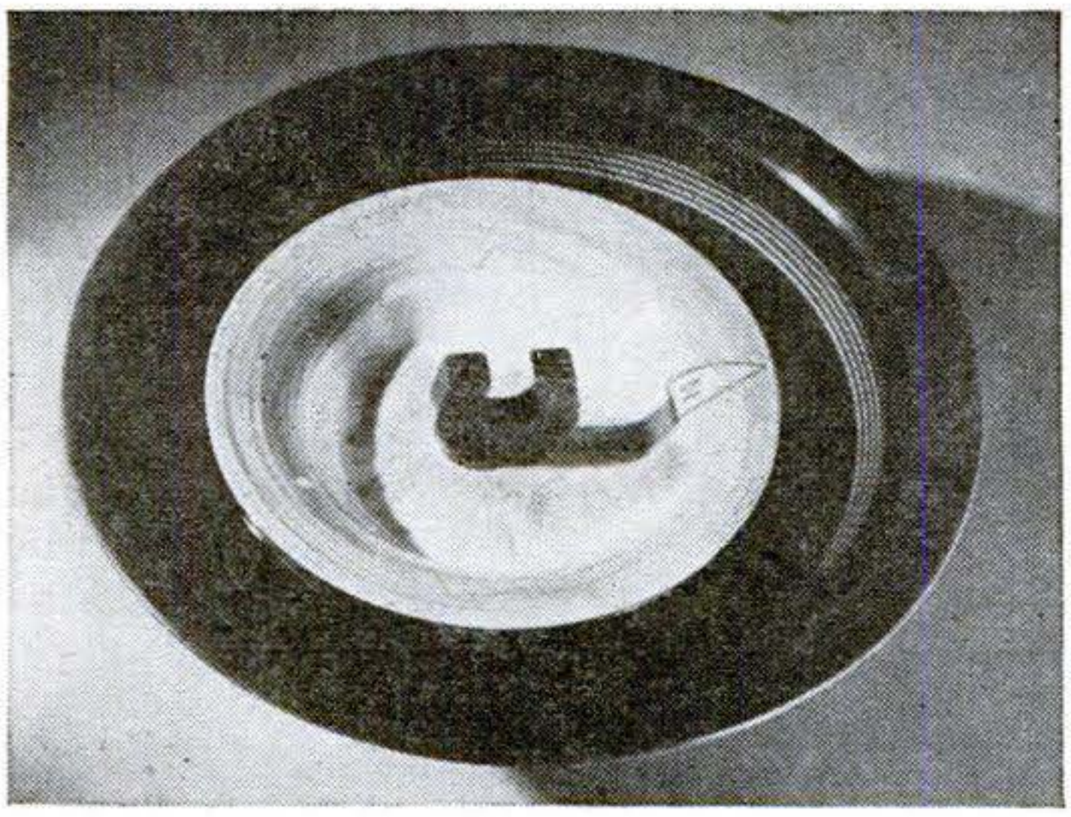




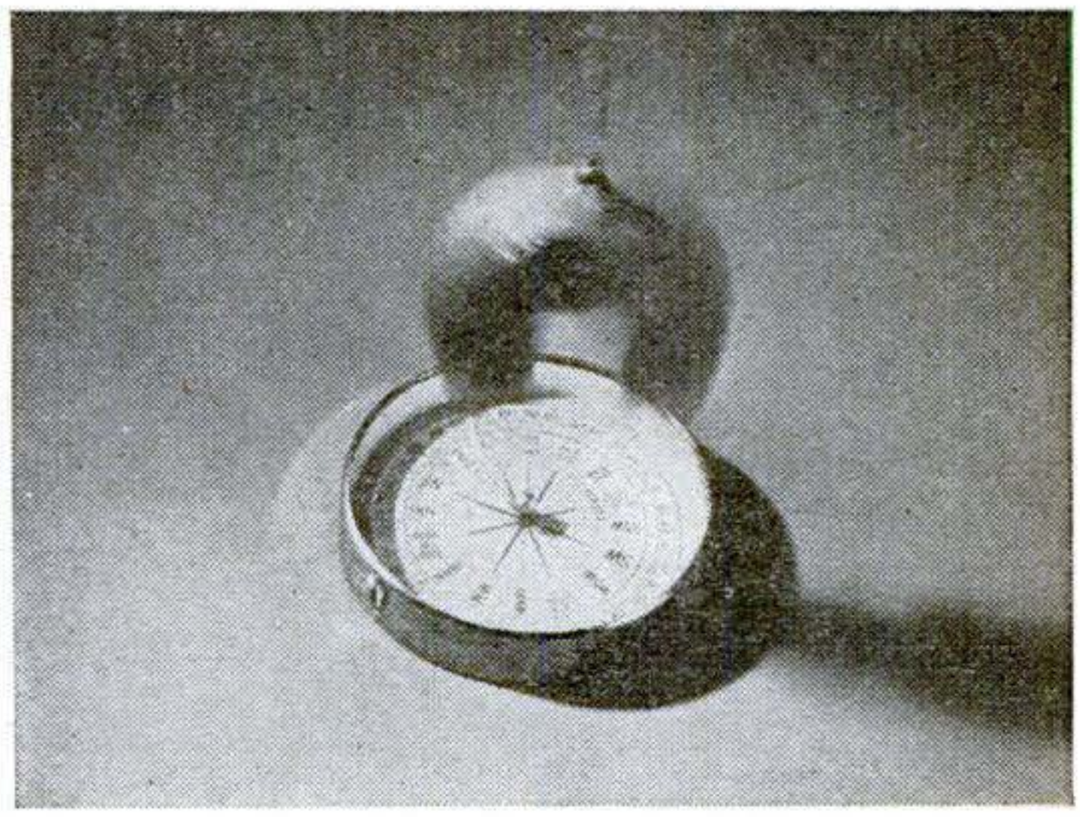


Copyrighted material

# STUNTS WITH SUPERMAGNETS

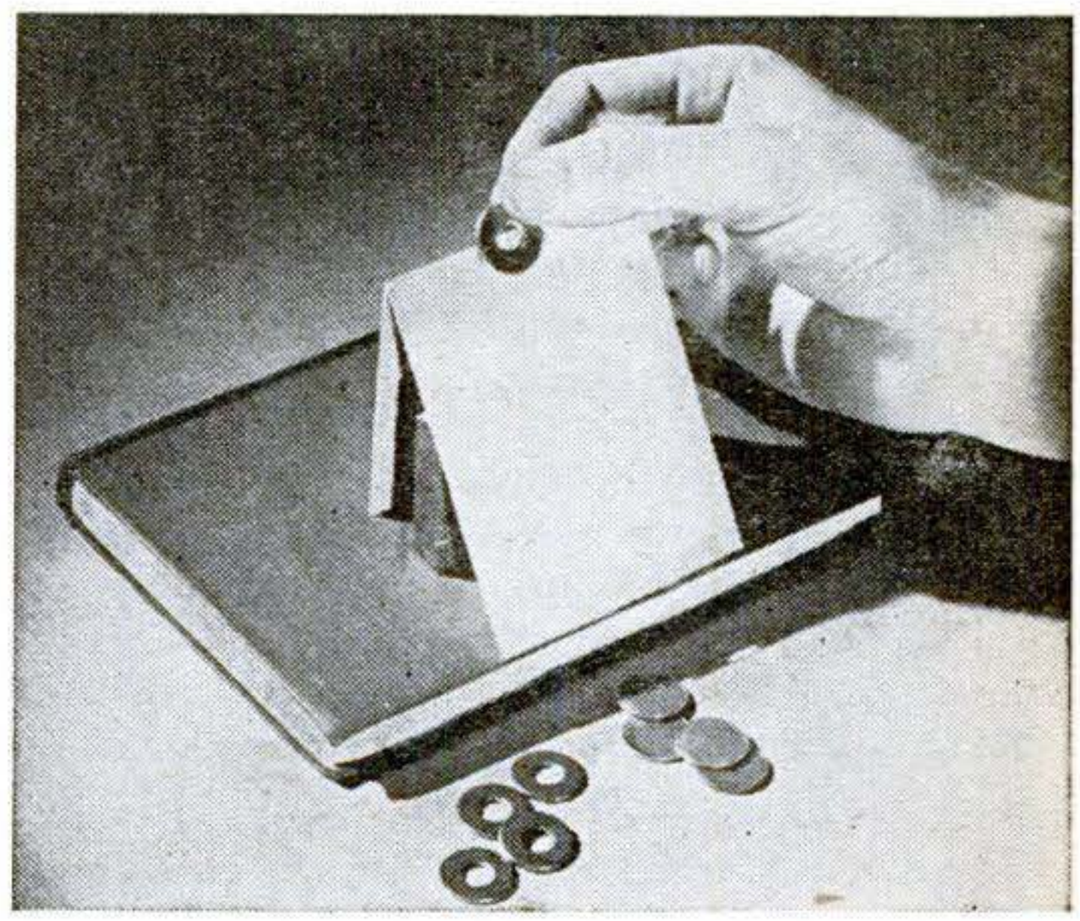


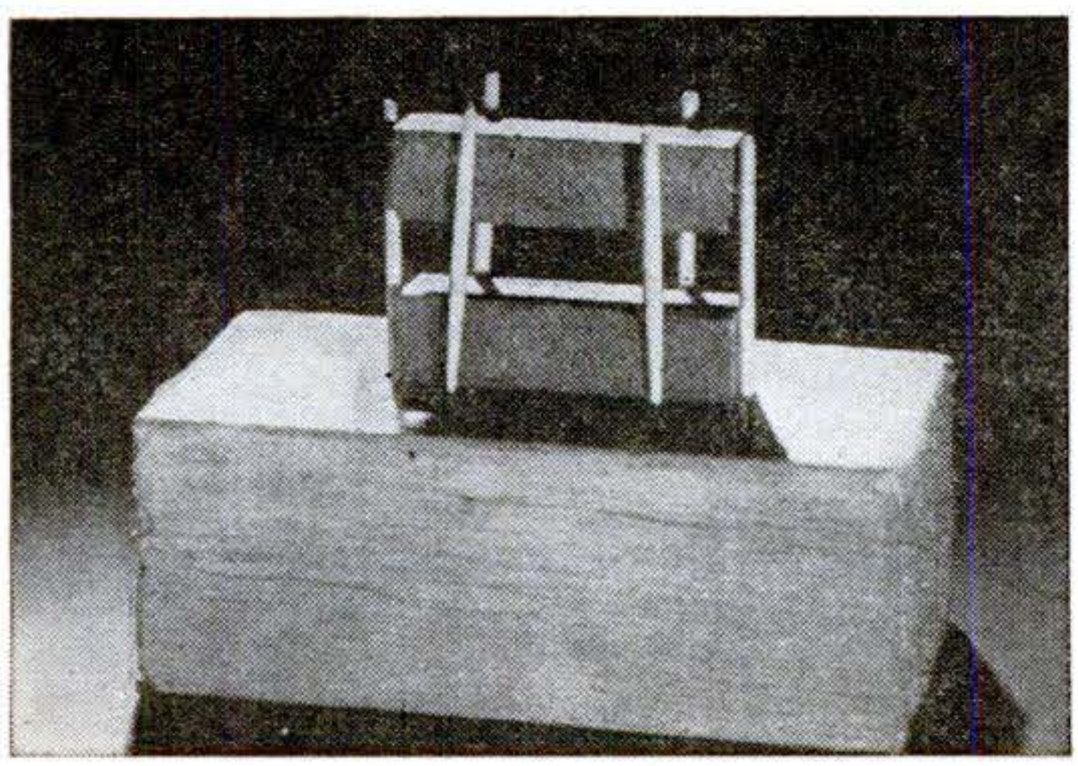
**MAGNETIC COMPASSES** of the pivoted type were probably first tried in the early part of the 13th Century. Before that time, records spoke of lodestones, or natural magnets, mounted on wood and floated on water, and of such things as floating iron fish that "pointed north with their heads and south with their tails." None of these ancient compasses could compare in orienting force, however, with one that you can improvise by placing an alnico magnet in a saucer floating in a nonmetallic dish.



**SUSPEND A MAGNET** by a string several inches above a pocket compass, as above, twist the string, and then release it. As the magnet revolves, the compass needle will follow its movements precisely, although there is no mechanical connection between the two. This principle has been given a practical application in a chemical stirring device now in use. Placed in a chemical solution in a flask or beaker, a magnet revolves and stirs the solution when another magnet outside is rotated by a motor.

**LEVITATION,** the illusion of a heavy body hovering in air without support, has long been a favorite act of magicians. In their hands, the effect is obtained by trickery, but you can achieve the same result with two bar magnets—and no trickery is involved. Stick several toothpicks, or other nonmagnetic objects, into a block of wood around the edges of one magnet, as below, to serve as guides. Then place the second magnet above the other, with the poles of both in the same direction, and repulsion keeps the second suspended. The toothpicks should be loose and offer no vertical support.

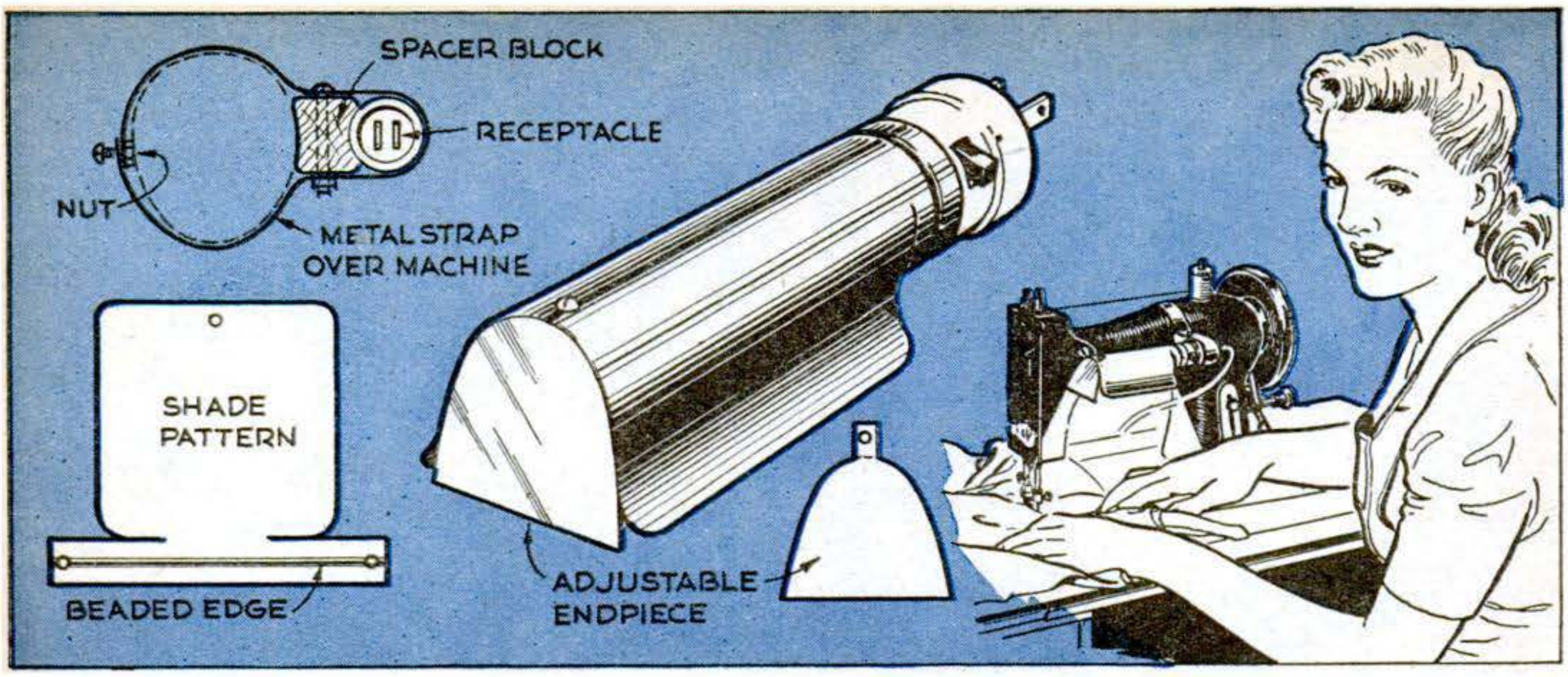




**COIN MACHINES** reject iron or steel slugs by magnetism. The principle by which this is accomplished can be demonstrated as above. Stand a bar magnet on end and bend a piece of cardboard over it so that the top of the magnet is about a third of the way from the top of the slope and to one side of the center. Then slide a succession of coins and iron washers down the slope, starting each from the exact center. The coins (except wartime zinc-coated ferrous pennies) will fall straight. The washers swerve aside.



Copyrighted material



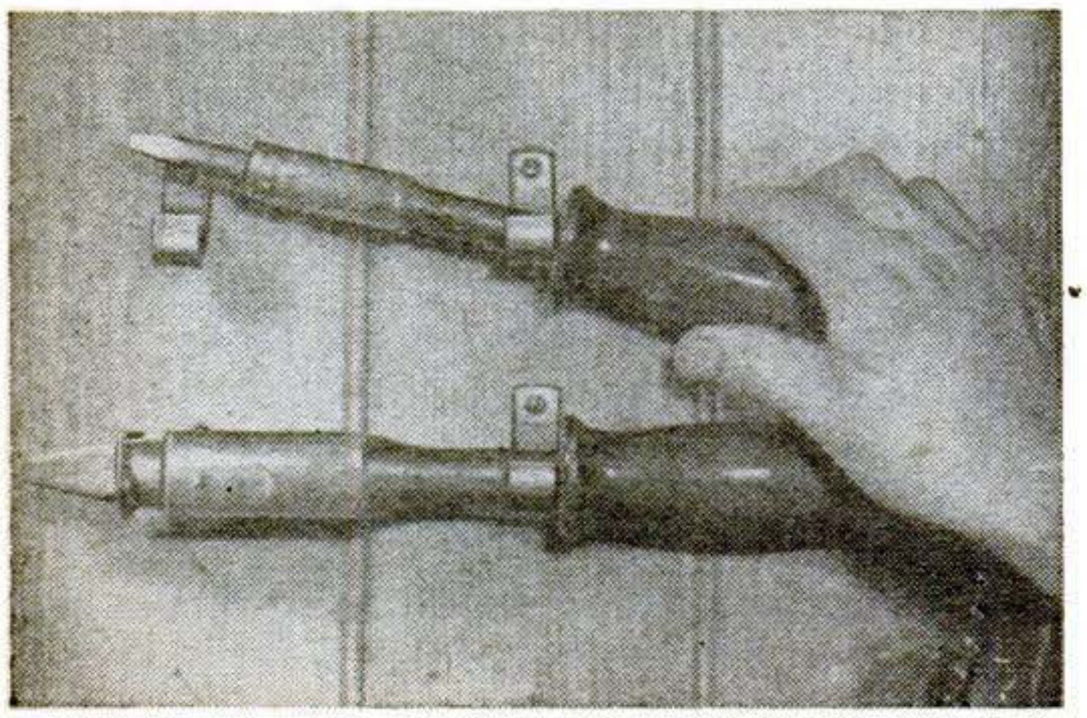

## Sewing-Machine Lamp Uses Night Light and Tin-Can Shade

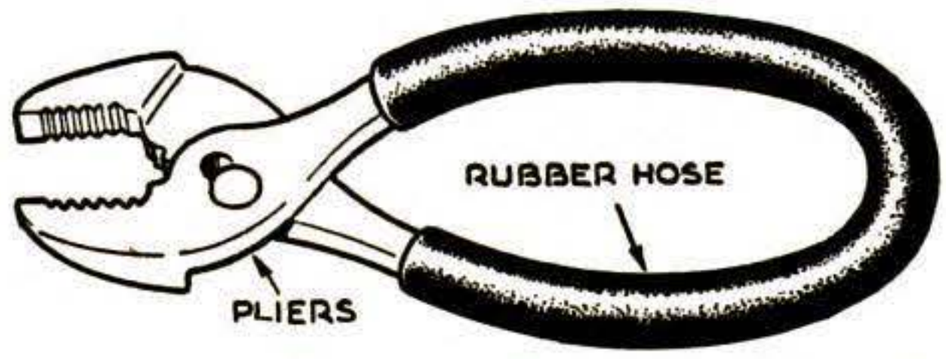
GOOD sewing demands good light. The sewing-machine lamp illustrated above can be improvised from a few odds and ends, but it will be quite as satisfactory as relatively expensive commercial ones.

The socket is a plastic night light of the kind having a snap switch in the body, while the lamp itself is a candelabra-base bulb that is somewhat brighter than the one furnished with the night light. A sheet-metal strap and spacer block clamp the female receptable to the sewing machine arm, permitting the light to be readily inserted or removed as needed. Ordinary tin-can stock, polished with steel wool before shaping, serves for the shade. If possible, use a coffee can, since the beaded shoulder is ideal for snapping around the night-light neck. A separate endpiece lets you reflect the light to where it's needed most.—G. E. H.

## Racking Hot Irons After Use Prevents Accidental Burns

WITH a pair of picture hangers used as supports, hot soldering irons can be safely racked on the shop wall immediately after use. Flatten the smaller curve of each hanger, and drill for a screw. As can be seen in the photograph below, the smaller iron (top) fits perfectly across two hangers. For the larger iron at the bottom, a bent curtain-rod screw hook is used to support the oversized point; the thinner section, near the handle, rests in the curve of a picture hanger. Be sure that the hooks are mounted on a noninflammable surface.—J. BACHNER.






## Hose on Pliers Acts as Spring

MECHANICS who often have to manipulate pliers with one hand will find that a short piece of rubber hose makes the job easier. Slipped over both handles, the hose tends to spring the jaws open when the grip is relaxed, so that it is unnecessary to shift fingers after each twist.—ROBERT BLAKER.

## Plastic Paint Insulates Tools

IF YOU find friction tape and rubber tubing become grimy and irritate your skin when used to insulate your electrical tools, try painting the handles with dissolved clear plastic instead. To make the plastic "paint," collect some plastic filings or shavings, put them in a bottle, and add an equal amount of acetone to dissolve them.

Several coats of the solution should be applied to the tool handles. Gripping surfaces can be roughened with a file, but don't bare the metal.—B. BILLINKOFF.



Copyrighted material

# LOOKING AT A LOG WITH YOUR MICROSCOPE

## Shavings from a Carpenter's Plane Reveal Structure of Common Woods.

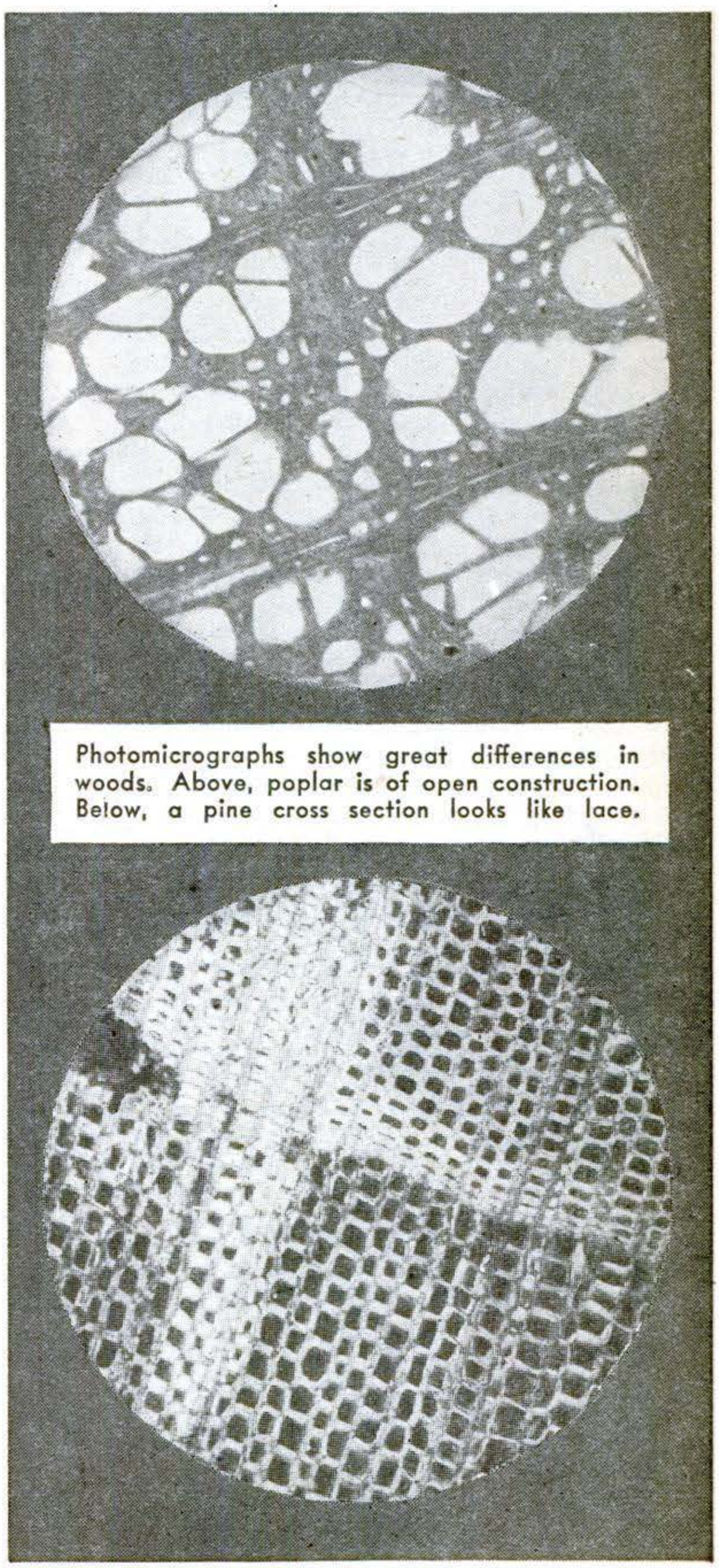
By MORTON C. WALLING

DIFFERENCES in various kinds of wood are readily visible to the unaided eye, and identification is usually easy. But what a world of weirdly beautiful textures, normally unseen, become apparent when thin shavings are placed under a microscope!

Shavings cut with a carpenter's plane may be used. Hone the plane iron to razor sharpness, adjust it to cut a shaving thinner than tissue paper, clamp the wood securely, and plane parallel to the grain. Pick up one of the shavings with tweezers, and placing it on a 1″ by 3″ glass microscope slide, hold it flat with a clean cover glass. Clean the plane, cut some shavings across the grain, and also mount one of these.

Under the microscope, the cross section resolves itself into a lacy network of tiny openings consisting of the walls of cells that have been sliced across. At the lower magnifications, it will be seen that these are arranged in curved bands. Near one edge of each band the cells become smaller and smaller. This is wood that grew in the late summer and fall. Then, suddenly, the cells become very large, indicating where rapid spring growth began the next annual ring.

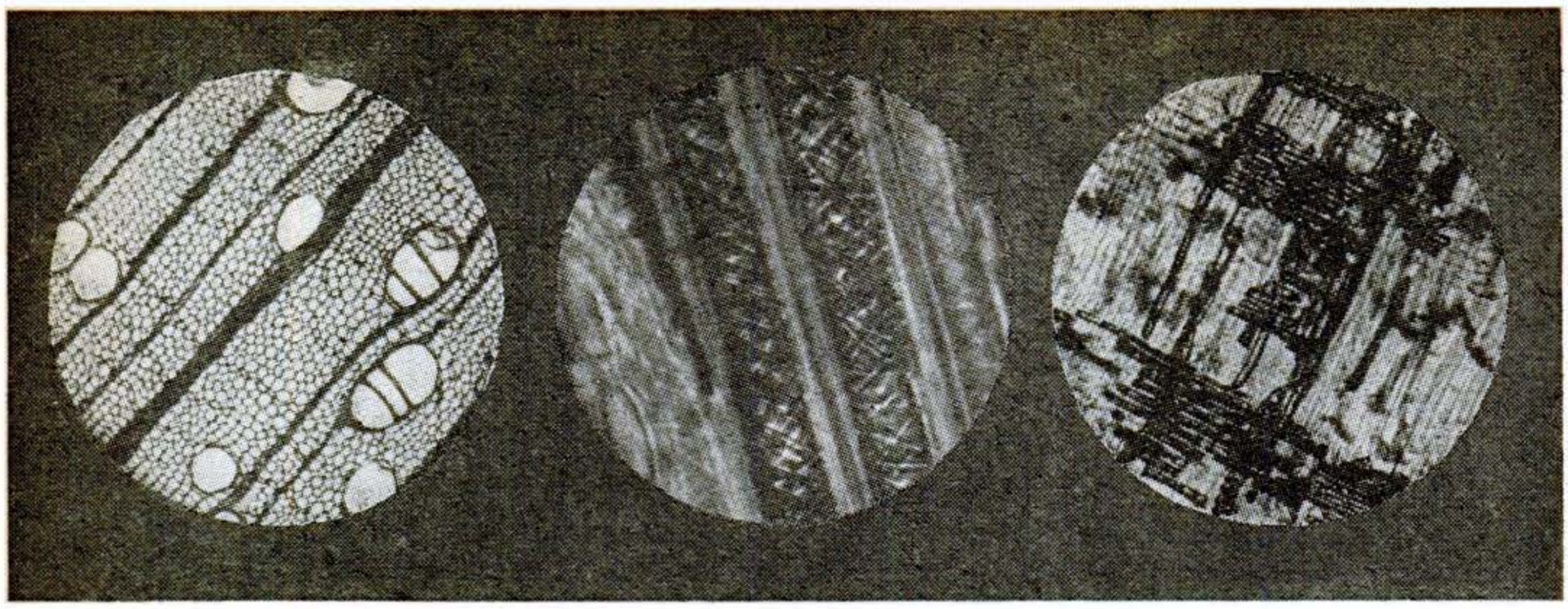
Here and there are large openings. These are resin ducts or canals. And straight rows of cells that usually are elongated run across the annual rings. These are medullary rays, cells



Photomicrographs show great differences in woods. Above, poplar is of open construction. Below, a pine cross section looks like lace.



Copyrighted material



**Large duct openings in a walnut cross section, left, are visible to the naked eye, and medullary rays are prominent in the radial oak section, right. Yew wood that was cut with the grain is seen in the center.**

that extend radially through the trunk of the tree.

It is possible to cut two kinds of sections parallel to the grain of wood. One is the radial section, cut on a plane extending along a radius of the tree trunk. This may show the sides of cells that comprise the medullary rays. The other is a tangential section. As its name suggests, this is cut at an angle to the radius. The cells of medullary rays are cut crosswise.

When you examine longitudinal sections of different kinds of wood with a microscope you will observe that cell walls exhibit various forms. In pine, most of the cells are tracheids, characterized by considerable length and numerous pits with ring-shaped borders around them, and there are occasional resin canals. In some woods, the cells may show spiral markings. The ducts, made up of short cells whose partitions have been absorbed, have walls that are marked by spirals and pits. Sometimes the ducts are single rows of cells. At other times they consist of numerous rows visible to the unaided eye, as in walnut and oak.

In some cases it may be desirable to stain the wood so that certain details may be more clearly seen. You can do this by applying iodine, mercurochrome, a wood stain, or one of the various microscope stains. One way is to place the shavings on a glass slide, add two or three drops of water, and then a drop or two of stain solution. Or you can immerse the sections for a time in a bottle or jar of stain. After application of a water stain, rinse the specimen in clear water, preferably distilled, to remove excess coloring. Such stained sections may be observed dry, in water, or mounted permanently in Canada balsam.

This balsam preferably should be of the filtered variety made for microscope work. The specimen must be free of water. If there is any doubt about its dryness, it may be kept for a time in a warm dry place.

## CHEMISTRY QUIZ

EACH of the following lines describes one of the metals listed below. Indicate your answer by placing the number of the line next to the name of the proper metal.

1. Can you name a metal that cuts glass with ease,
2. And another as soft as the wax of bees?
3. A third is so heavy it weighs more than lead,
4. While a fourth could float upon water like bread.

## CONTRAST IN METALS

5. Now there's one you can beat to your heart's content;
6. Still another's so brittle it snaps when it's bent.
7. There's a metal that melts while it's colder than snow,
8. And there's one that resists the coal's hot glow.
9. Now, this one will break under stress that is slight,
10. But the last may be labeled the metal of might.—F.S.

**—Bismuth** **—Steel** **—Antimony**
**—Tungsten** **—Lead** **—Lithium**
**—Chromium** **—Potassium** **—Mercury**
**—Gold**

**ANSWERS:**

1. Chromium. 4. Lithium. 8. Tungsten.
2. Potassium. 5. Gold. 9. Lead.
3. Bismuth. 6. Antimony. 10. Steel.
7. Mercury.



Copyrighted material

# Cellulose...

## MYSTERY COMPOUND IN PLANT LIFE

### Chemists Still Don't Know the Size of Its Molecule.

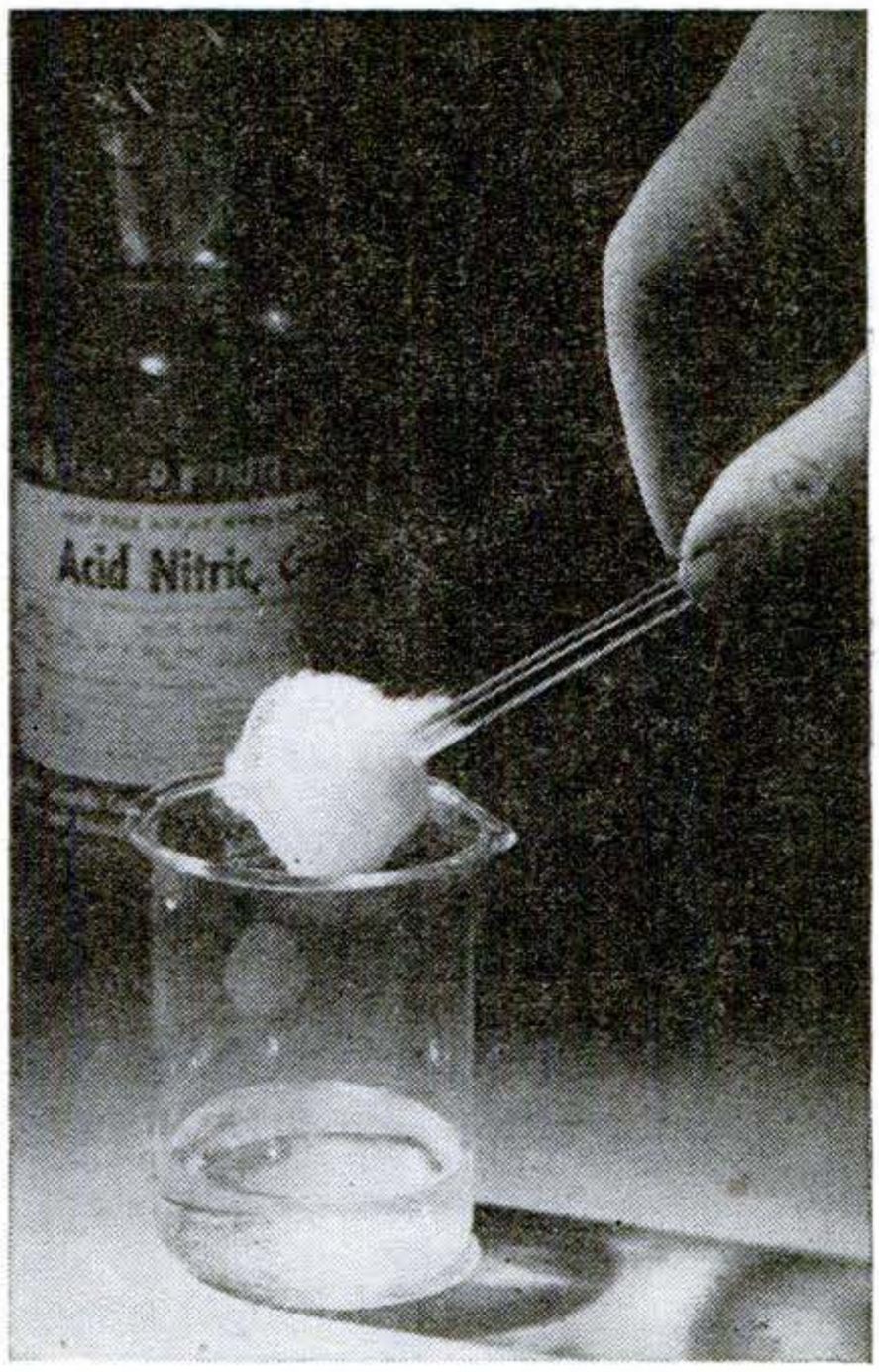
By KENNETH M. SWEZEY

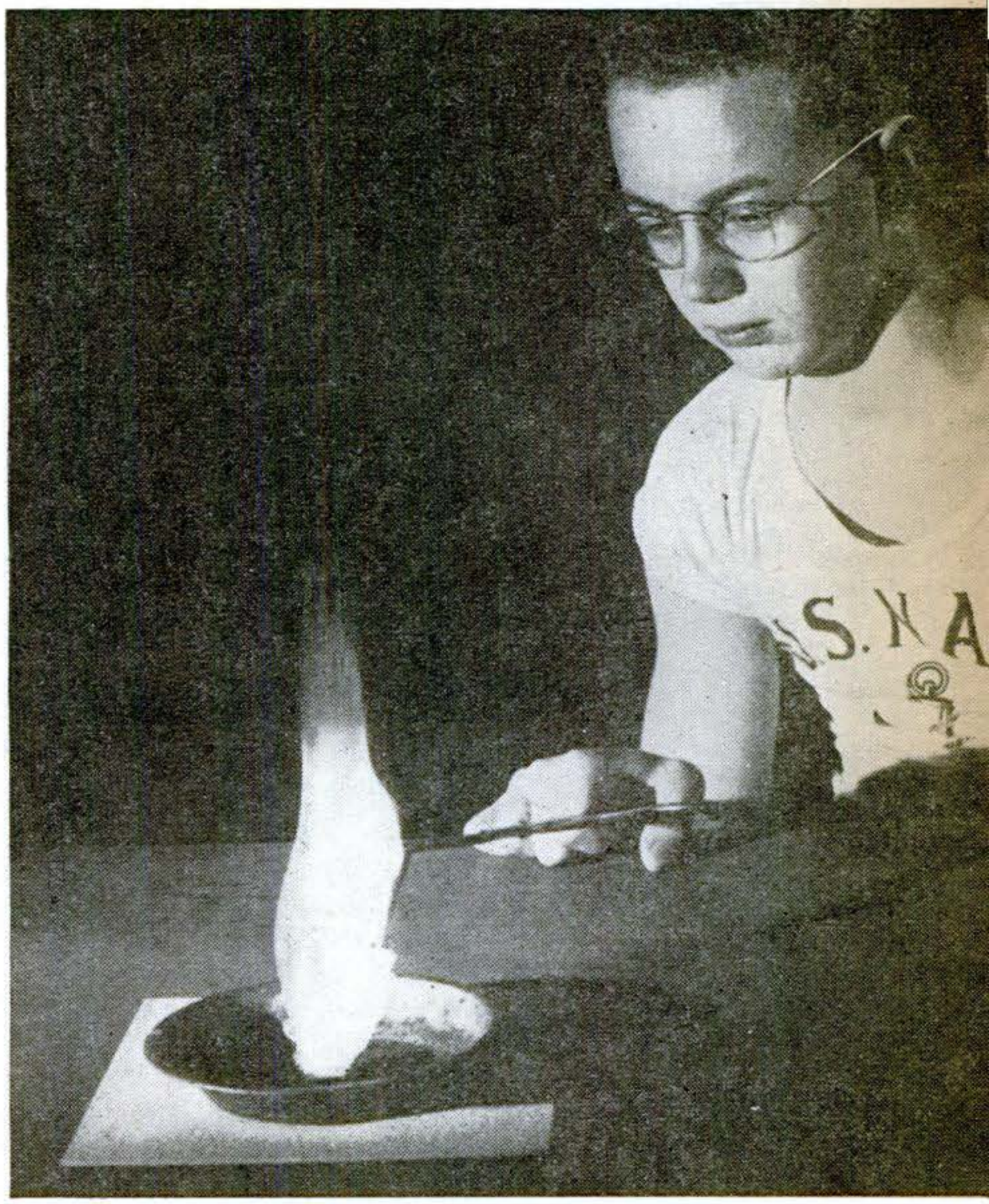
CELL WALLS and the supporting framework of all trees and plants on the earth consist largely of cellulose, but this complex substance, strangely enough, is still one of the most mysterious of chemical compounds. Its common formula is exactly the same as that of starch $(C_6H_{10}O_5)x$, with the $x$ signifying an unknown number of units which make up its giant molecules. But unlike starch, cellulose does not dissolve in any ordinary solvent and cannot be changed by the digestive juices into food for the human body.

Largely because of its refusal to go into solution without becoming chemically changed, chemists never have determined the exact size and structure of the cellulose molecule. Yet, despite this lack of precise knowledge, dozens of practical wonders are worked with this plentiful material.

Untreated cellulose, such as cotton, linen, jute, and other plant fibers, has been fashioned into textiles and ropes since the beginnings of history. Rayon, the modern competitor of these natural fibers, is made by chemically breaking down the cellulose of trees, dispersing in a liquid, and regenerating it in the form of strong silklike threads. Similarly, cellophane is regenerated cellulose that has been pressed between rollers. Paper is made of cellulose from trees or cotton, ground up, chemically treated, and finally squeezed into sheets.

Next to textiles and paper come important

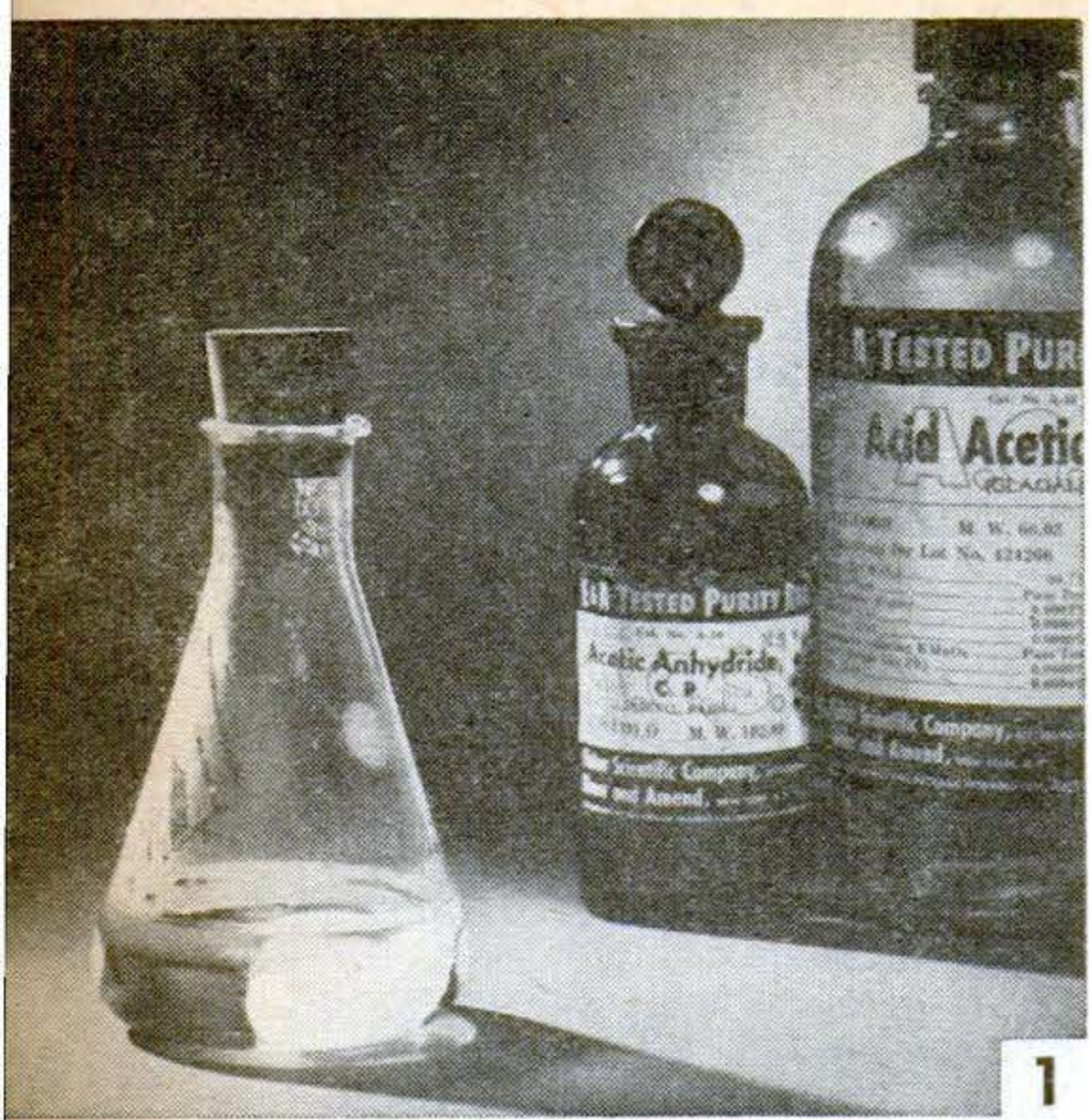


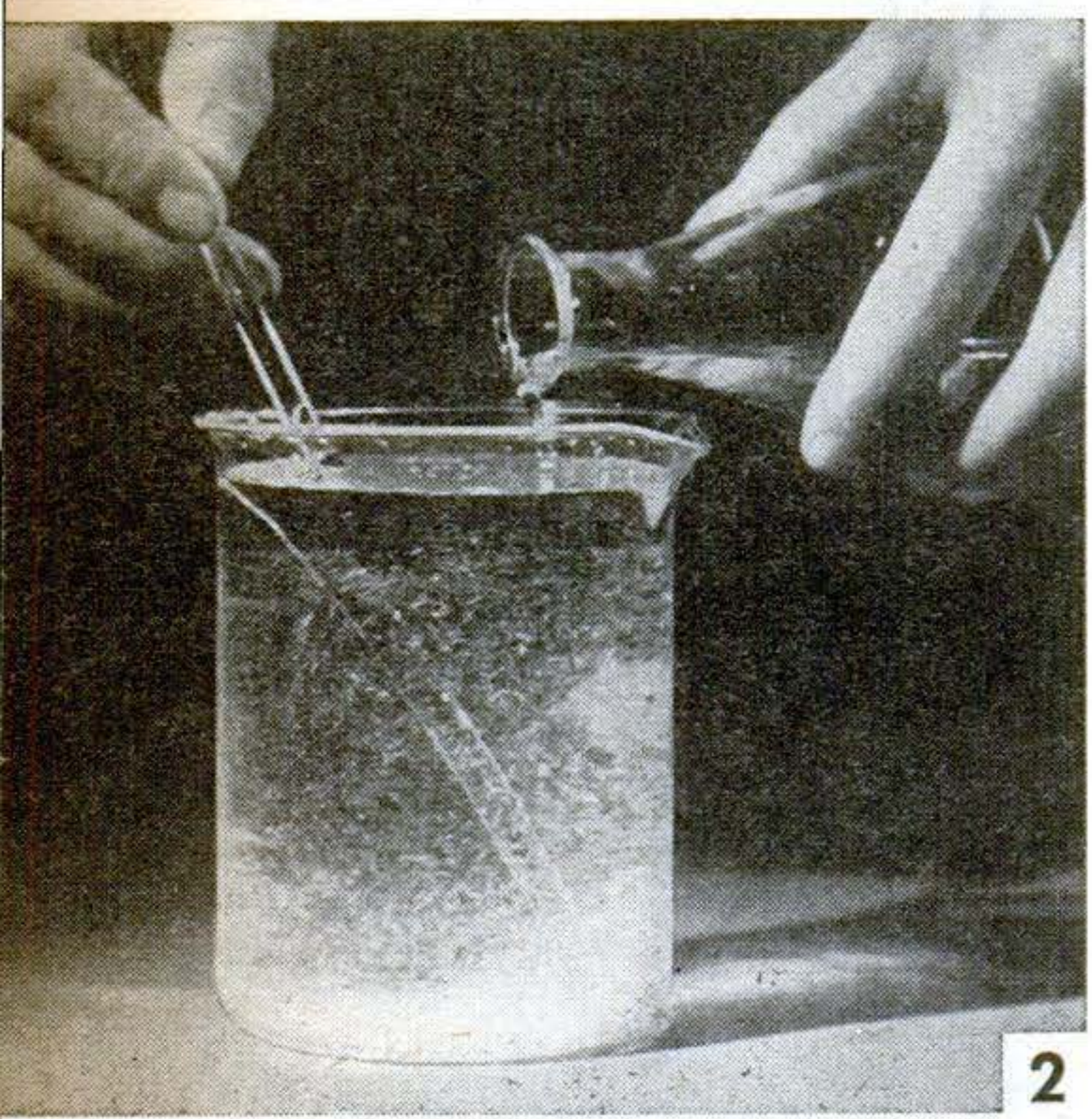
Cellulose, such as the wad of absorbent cotton above, yields pyroxylin when it is treated with a mixture of nitric and sulphuric acids in a carefully controlled process. At the right, dried pyroxylin burns furiously. Pyroxylin is used for paints and many other important items.



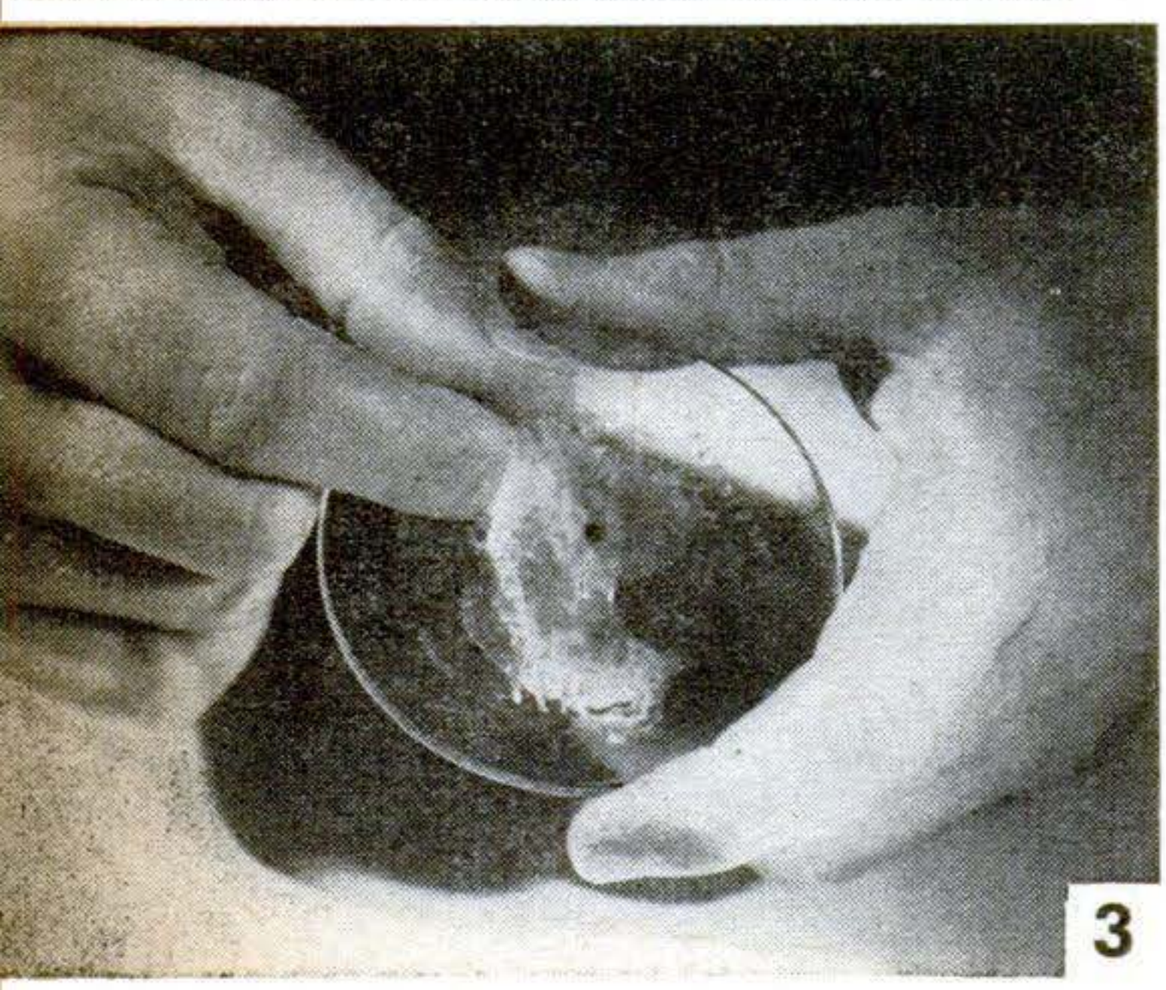
Copyrighted material




1



2



3

products derived from the nitrocellulose family. These include smokeless powder and other explosives, photographic film, collodion, celluloid and related plastics, paints, dopes, lacquers, cements, and finger-nail polishes.

When cellulose is attacked by concentrated nitric acid, certain hydrogen-oxygen groups of the cellulose units join with the hydrogen of the acid to form water. At the same time cellulose nitrate is formed. This nitration takes place in stages, depending upon the concentration and temperature of the acid and the length of treatment.

When maximum nitration occurs, highly explosive guncotton results. Lesser nitration yields the nonexplosive pyroxylins, or "soluble cotton," used for paints, films, and plastics. Guncotton is too dangerous a substance to be made in the home laboratory, but the lower nitrated pyroxylins can be produced safely.

Carefully mix exactly 5 ml. of water, 34 ml. of concentrated sulphuric acid, and 15 ml. of concentrated nitric acid in a beaker. Cool the mixture to 30 deg. C. by standing the beaker in a pan of water at that temperature, and then add ½ gram of absorbent cotton in one piece. Stir the cotton in the solution occasionally, and maintain at the 30-deg. temperature for 20 minutes.

Then remove the nitrated cotton with a glass rod and immerse it immediately in a large beaker of cold water. Wash thoroughly in cold water and finally in warm water. When the washings no longer show an acid reaction to litmus paper, squeeze the cotton as dry as possible and spread out to dry at room temperature.

This is your pyroxlin. When it is dry, put a small piece in an upturned jar cover and light it cautiously *with a match held in tongs.* It should burn furiously.

Collodion, a liquid once used extensively to protect skin abrasions, can be made from the remainder of your pyroxylin. Place it in a test tube containing 5 ml. of ether and 5 ml. of ethyl alcohol. Cork the tube and allow it to stand overnight. The next day pour off the clear solution—the collodion. Put a little in a glass plate and allow the solvent to evaporate. When dry, the pyroxylin that remains can be removed as a continuous film, a close relative to photographic film.

Cellulose acetate is more expensive to manufacture than pyroxylin or cellulose nitrate, but the fact that it burns only with difficulty makes it valuable where there is danger of fire. Cellulose acetate also is the basis of a group of plastics. Spun into thread, it is the textile "Celanese."

To make cellulose acetate, put 20 ml. of glacial acetic acid and 5 ml. of acetic anhydride

**Cellulose acetate is produced by dissolving cotton in acetic acid and acetic anhydride (1), then stirring in water (2), drying the precipitate, and dissolving in chloroform. The resulting film (3) is noninflammable.**



Copyrighted material

into a small Erlenmeyer flask and add 3 drops of concentrated sulphuric acid to act as a catalyst. Submerge ½ gram of absorbent cotton in the solution with a glass rod, stopper the flask, and let it stand for eight hours or so until the cotton disappears. Then slowly pour and stir the solution into water in a large beaker. Collect the gelatinous precipitate by filtering the solution through a large funnel. Press the water from the precipitate by squeezing between filter papers.

After allowing the crude acetate to dry, put a little in a test tube with a small quantity of chloroform and let it stand, giving it a shake occasionally, until the solid has dissolved. Then pour some on a glass plate and allow the solvent to evaporate. As with collodion, a film will form. Remove by wetting for a few minutes with water.

If you now hold a piece of your cellulose acetate film in a flame it will burn only while in contact with the flame.

It may sound strange to anyone who has seen filter paper disintegrate in sulphuric acid that a short immersion may so affect the cellulose that the paper is tougher and stronger. Parchment paper is made by this means. See for yourself by carefully adding 2 volumes of sulphuric acid to 1 of water. (Be sure to add the acid to the water.) After the solution has cooled to room temperature, dip a strip of filter paper into it for just 15 seconds. Then wash the paper in water to which a little ammonia has been added and allow it to dry.

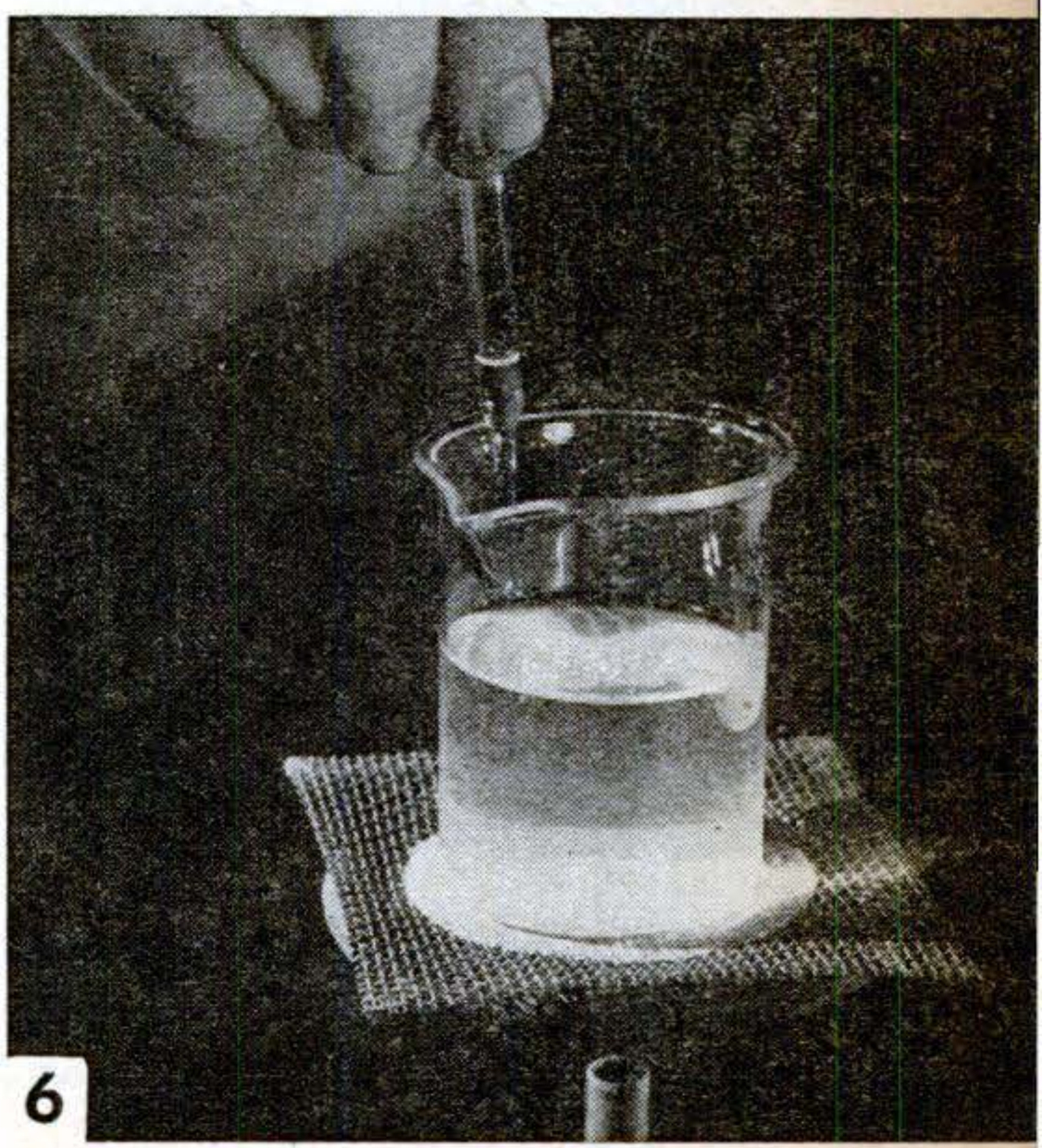
Although you can't get nourishment directly by eating sawdust or cotton, chemists can, when pressed by war or famine, transform such forms of cellulose into satisfying food. You can find how it's done by tearing half of a 5″ sheet of filter paper into bits and grinding these in a porcelain mortar as you add cold concentrated sulphuric acid, drop by drop. Have the mortar and acid cold, and do not work too fast. When all the paper has disappeared, the solution should be yellowish or light brown. If it turns black, the acid has worked too vigorously. In that case, discard it and try again.

When the paper has dissolved, cautiously add about 50 ml. of water, mix with a glass rod, and transfer to a beaker. Boil this solution gently for half an hour, keeping the volume constant by adding water as evaporation occurs. After cooling, neutralize it with a 20-percent sodium hydroxide solution.

Pour a little of the product into a test tube containing Fehling's solution and heat gently. The blue solution will quickly change to yellow, brown, or brick red, indicating the presence of a reducing sugar—in this case, dextrose.

4

5


6

Dipped into sulphuric acid (4), filter paper turns into parchment. Simple sugar also can be made from paper by grinding in sulphuric acid (5), adding water, boiling, and neutralizing. Tests (6) show sugar is present.



Copyrighted material

# SIMPLE REPAIRS

CAREFUL inspection of your folding lawn chairs when you take them out this spring may save a disconcerting spill later in the summer. A few simple repairs will restore them to their original condition. Then if you form the habit of checking and repairing each fall or spring, you can make them last season after season. Repainting, of course, is best in spring, for then the chairs look their newest when in use.

Try the rungs with your hands and replace those that appear weak before they can break and tear the canvas fabric. Hardwood doweling of the same diameter sometimes makes even stronger rungs than the original.

To remove a weak rung, first pry out the tacks holding the fabric and the small nails locking the ends (Fig. 1). If the heads of the locking nails have rusted off, saw the rung in two and twist it out, taking care not to damage the hole.

Measure the old rungs carefully and cut the new ones to exact length so clearance will be maintained, as in Fig. 2. Then paint inside the holes, as shown in Fig. 4, and the ends of the new rungs before assembling to keep out moisture and prevent rotting. Use only an outdoor paint.

Check the rails for cracks and fill any found with calking compound, as in Fig. 3, to keep them from spreading. It is good practice to check for cracks once or twice during the summer, for more cracks may be started by penetration of moisture and the drying action of sun and wind. The tops of the rails are usually the most vulnerable spots.

Canvas that has been snagged but is otherwise strong can be stitched up or patched, but when it is badly worn it is best to replace it with new canvas. If the old canvas is available for measuring, cut the new piece to exact length, using a steel square to get the ends square, as shown in Fig. 5. The length should be the distance between rungs, plus enough material to wrap around each rung 1½ times, plus 1″ or so of slack.

Canvas is easy to replace on rungs before they have been assembled. Simply tack it on, folding the corners under, as in Fig. 6, and round off the tack heads with the hammer, as in Fig. 7, to protect the fabric.

On an assembled chair, start with the lower rung, tacking the canvas on, rounding the tack heads, and wrapping the fabric around, as shown in Fig. 6. Working on the top rung will be a trifle more difficult, for the canvas must be wrapped around it 1½ times before tacking. Figure 8 shows a method of accomplishing this. Set the chair up so the canvas will be slack, and put the first tack in a corner while holding the overlapping material to one side. Then stretch the canvas fully on the rung and put a tack in the other corner the same way. Work in toward the center.

It will not be necessary to remove the canvas every spring, but repaint the rungs whenever possible.—J. MODROCH.



Copyrighted material

# RESTORE LAWN CHAIRS

Fig. 1

CHAIR FOLDED UP

Fig. 2

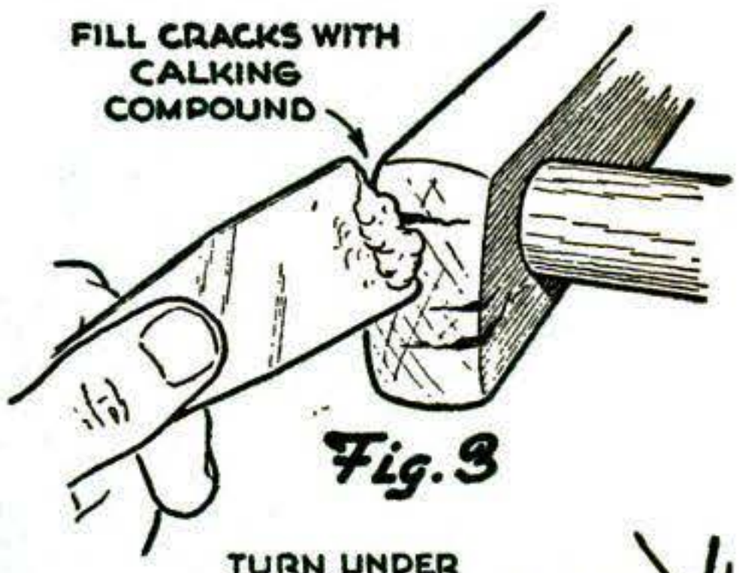



Fig. 3

Fig. 4

Fig. 6

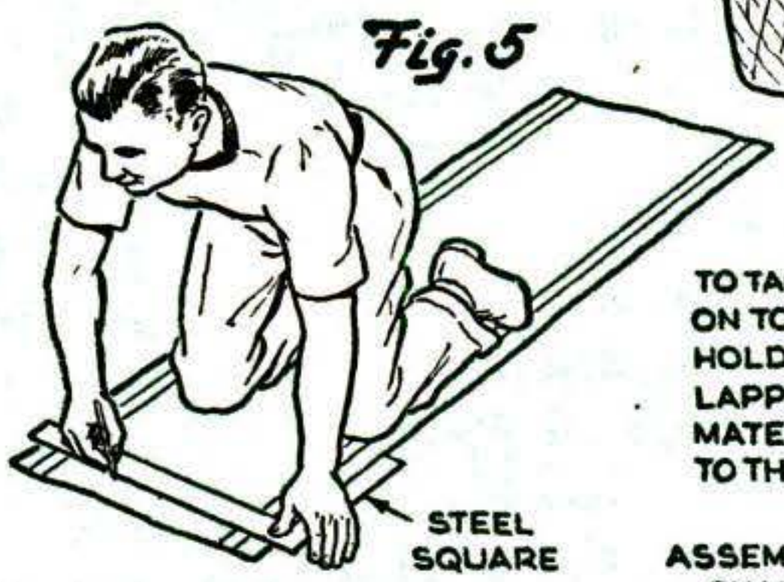



Fig. 5

CUT ENDS SQUARE TO MAKE FABRIC HANG EVENLY

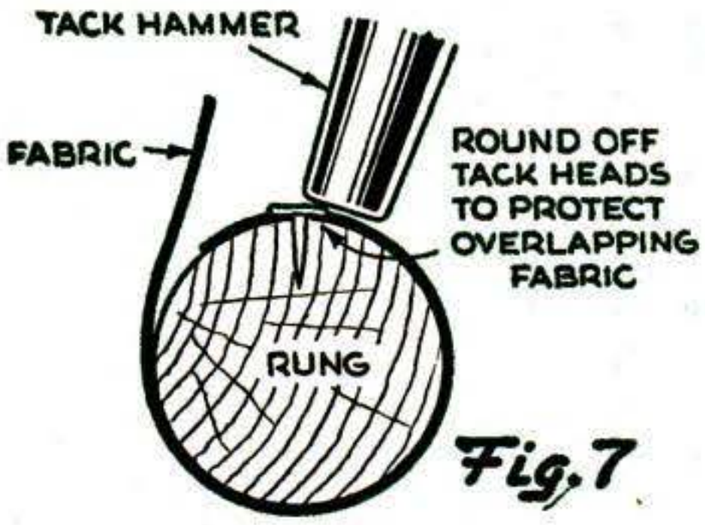
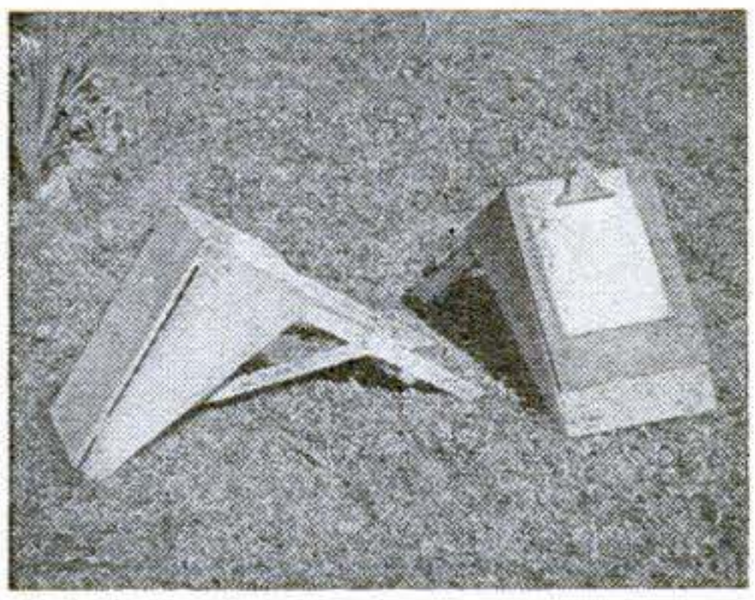



Fig. 7

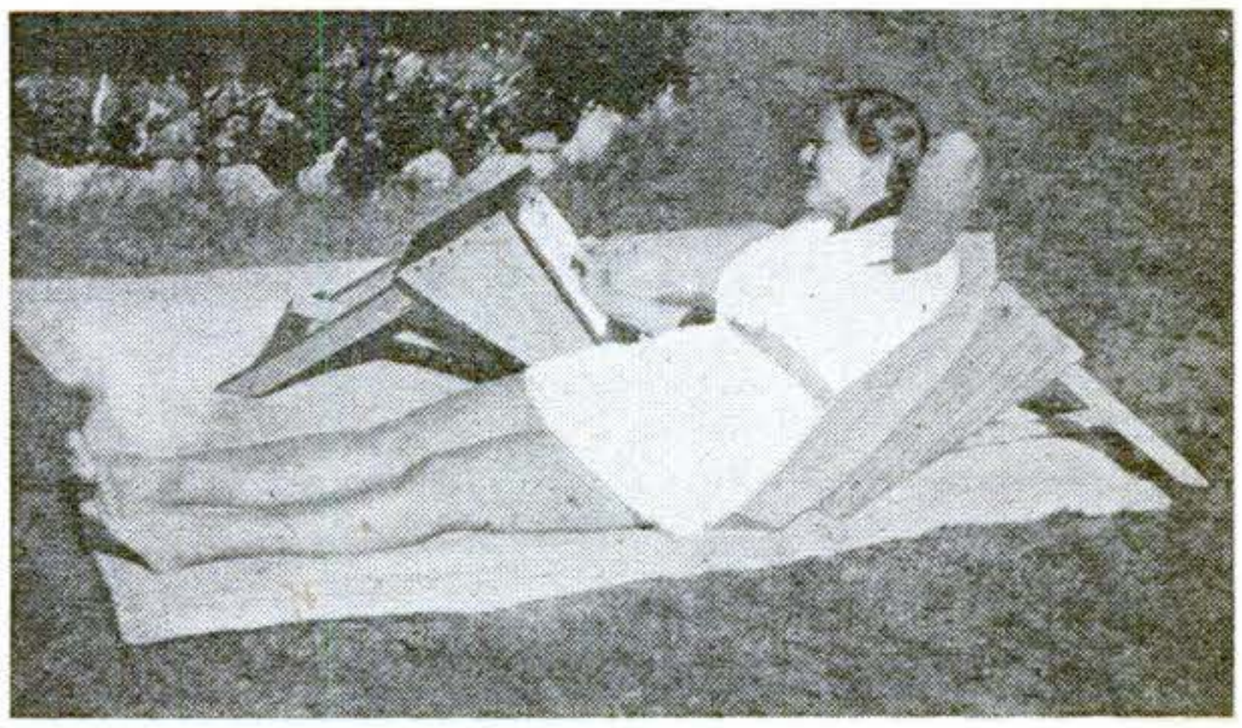
Fig. 8

## Back Rest and Writing Board Made from Single Box

TWO convenient back rests can be cut from one apple box or small packing case and braced in a jiffy for use on the lawn or beach. With a clamp from a hard-backed billing board attached, as indicated below, one can be converted into a comfortable writing desk or sketching board.—KENDRICK M. MARTIN.



An ordinary box sawed in half is an aid to lolling on the lawn or beach.





Copyrighted material

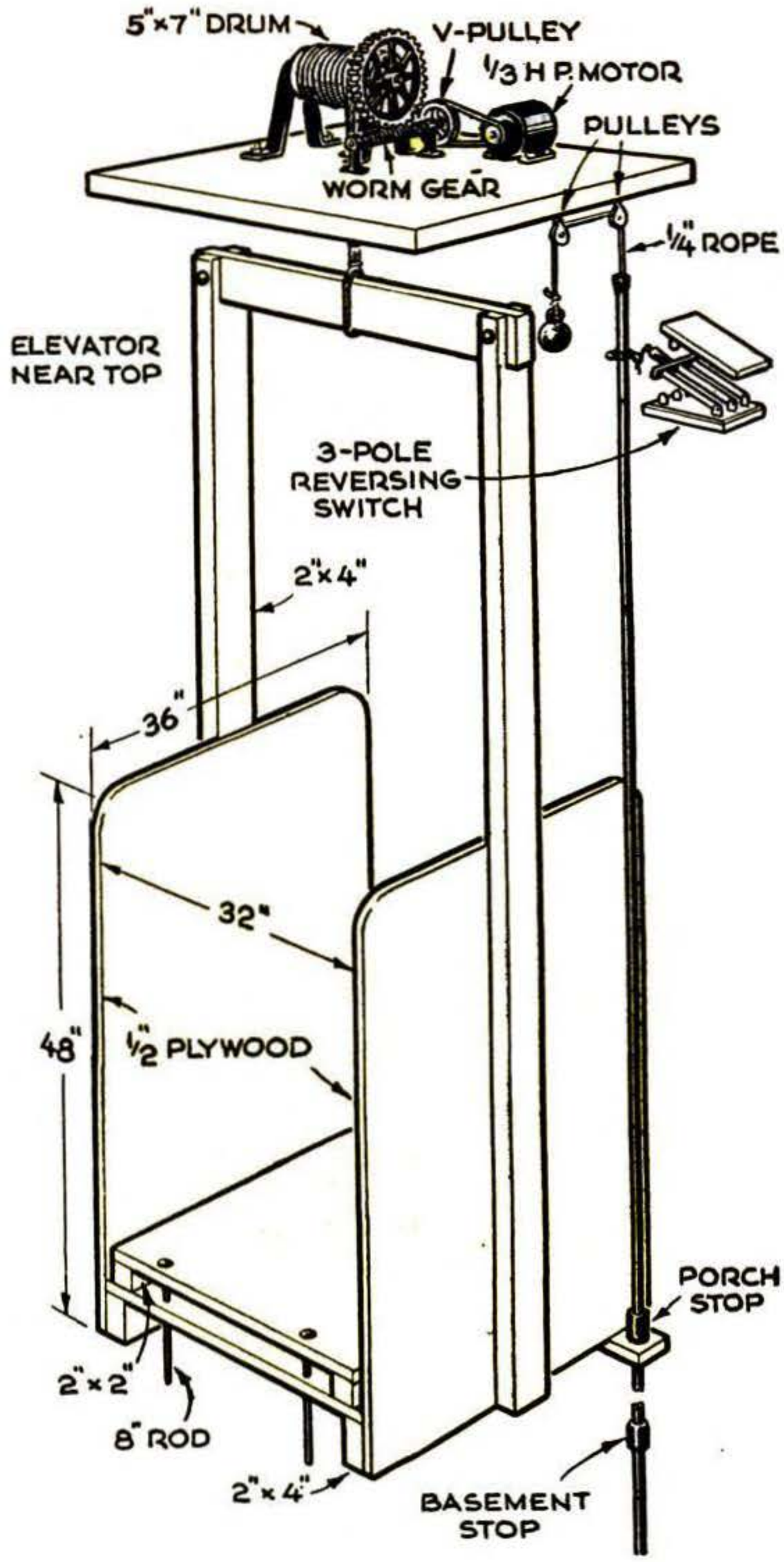
# HOMEMADE ELEVATOR GIVES FARMER A LIFT

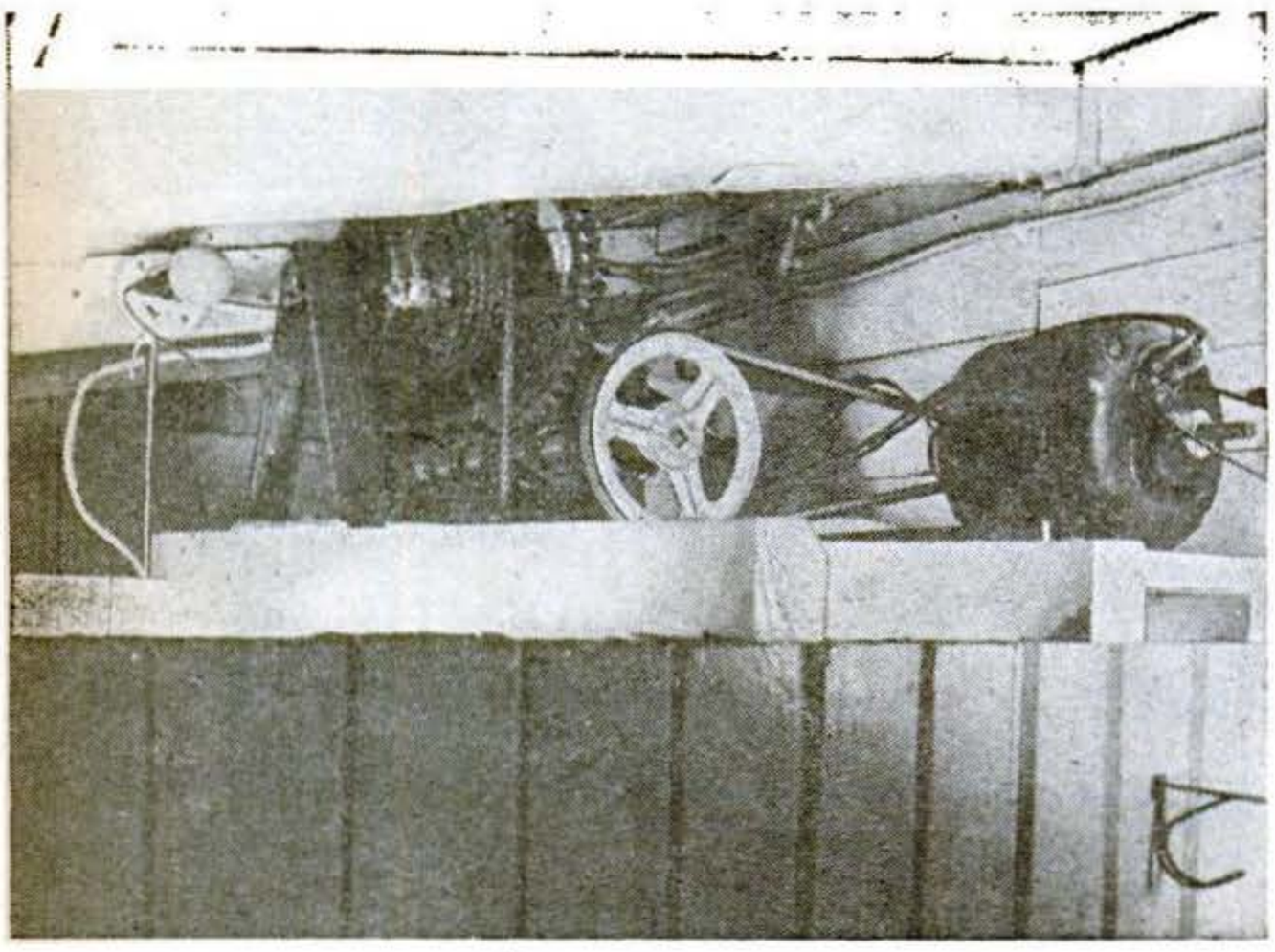
EVERY time John Waggoner, an Illinois farmer, has to bring up a case of eggs from the basement, his private elevator stands ready to give him a helping hand. Running from the porch to the basement, the homemade hoist has power and space for a payload as well as a passenger.

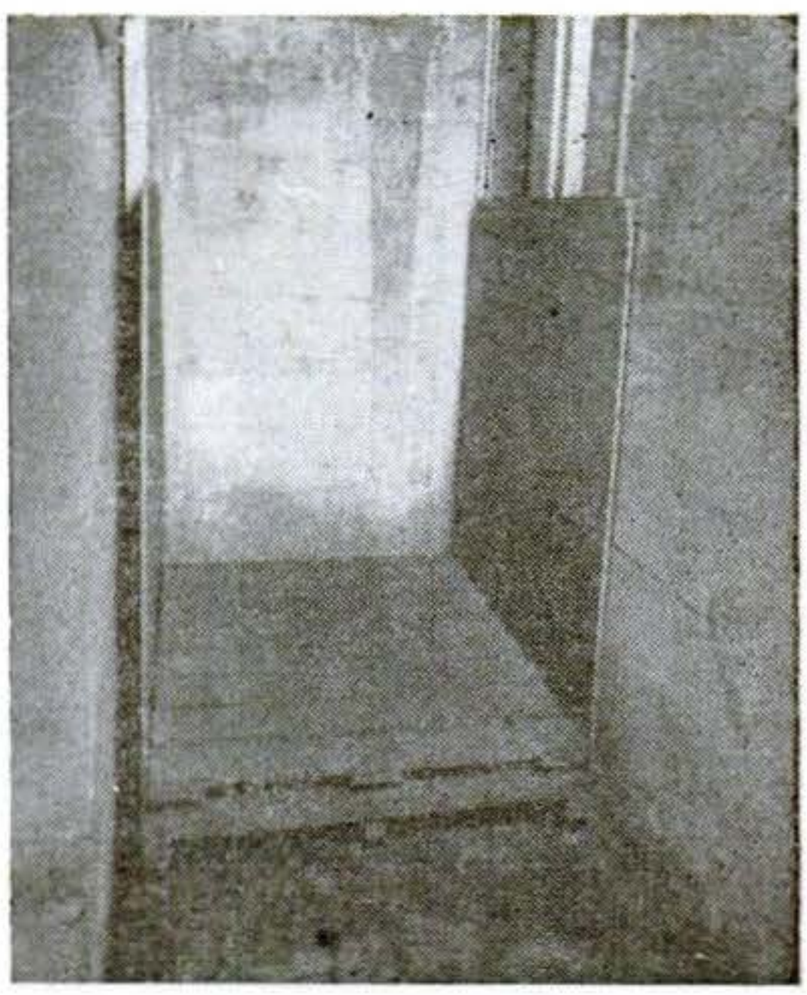
The motive power is a 1/3-hp. electric motor that drives a 1-to-40 worm gear through a 1½-to-5 V-belt combination. A length of 5″ iron pipe serves as the drum. From the hoisting-machinery platform a counterbalanced wooden rod runs down to the basement, and is linked to the reversing switch. The latter is a knife switch modified so that one set of poles is above the other.

If Waggoner is in the basement and wants a ride up, he steps aboard the elevator and pulls down on the control rod alongside. The car then rises until the porch stop lifts the rod up, stopping the car. On trips down he lifts up on the rod and the car descends until the basement stop pulls the control to the neutral position. Since the worm gear is irreversible, a current interruption would do no harm, but Waggoner keeps a stepladder handy, just in case.

Compelled to use a split-phase rather than a repulsion-induction motor, he found that the motor had ample power once it was running but was badly overloaded at the instant of starting on upward trips. Waggoner then built a false floor in the car, supported in the basement by four legs that extend beneath the elevator. This supplementary floor now allows the motor ample starting time before it picks up the load on upward trips.—E. W. LEHMANN.



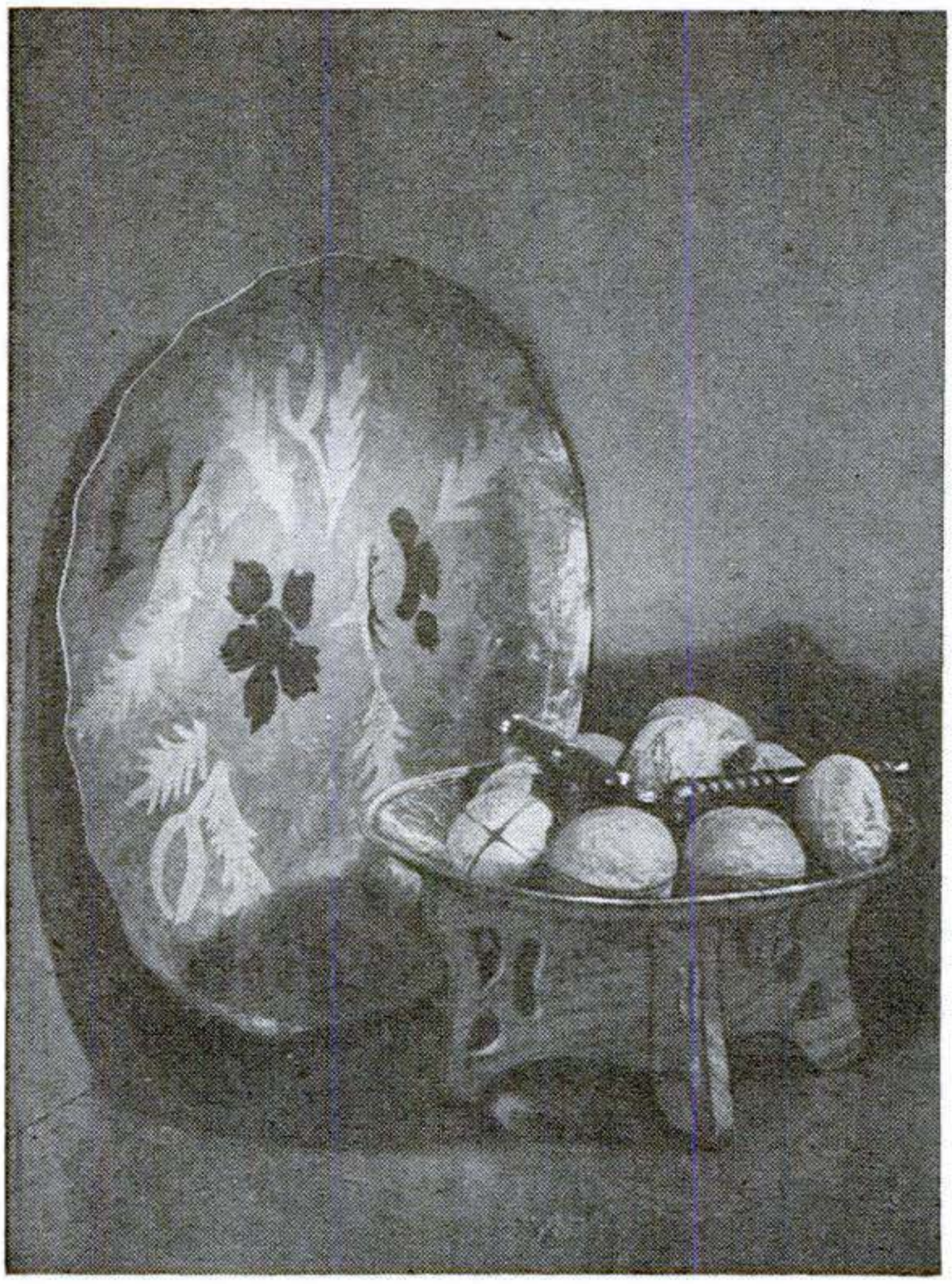



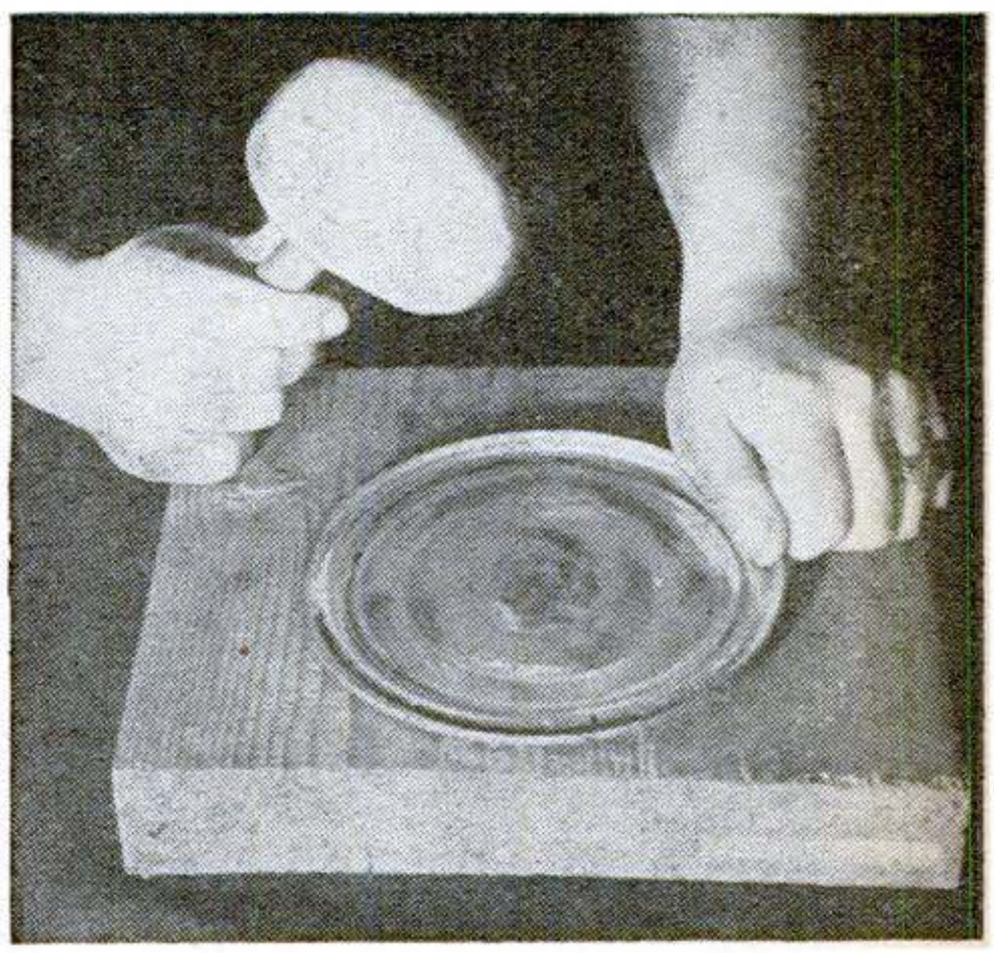


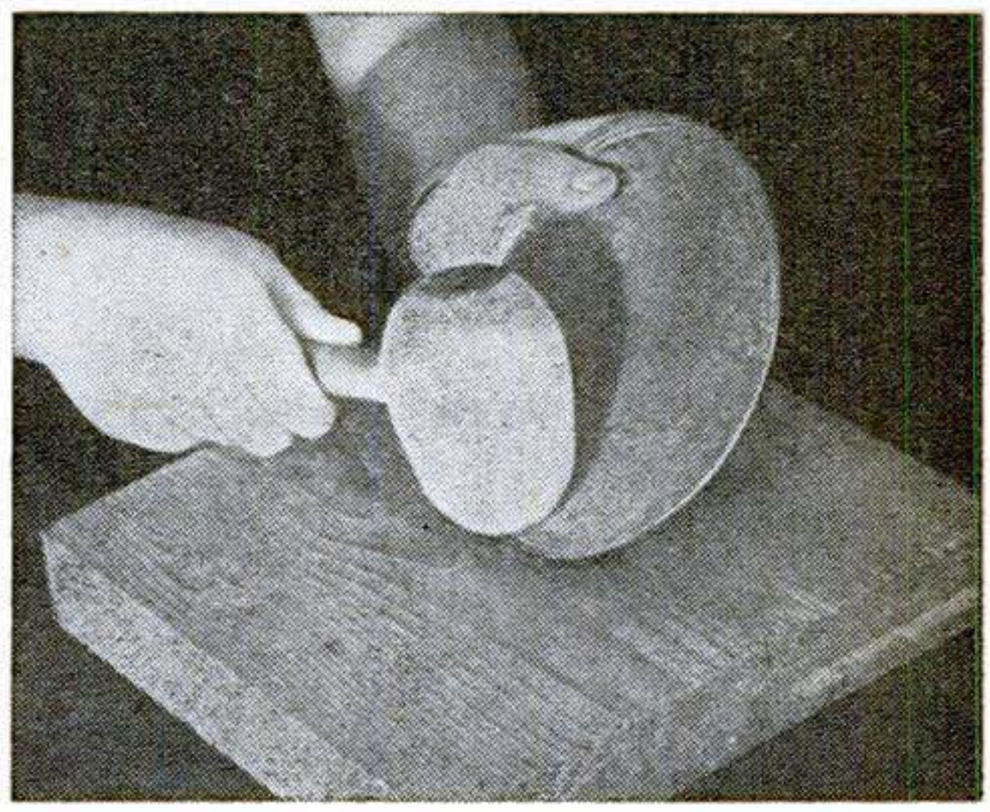


Copyrighted material

# Tin-Can Ends Shaped Into Bowls







**Two bowls, one hammered from the end of a common tin can and the other from a large pail cover. The small one rests on a wooden stand, shaped as shown below.**

HANDSOME hammered bowls can be made from material as prosaic as the ends of common tin cans. The tin plate takes enamel well, and various designs can be painted or stenciled on for ornamentation. Or, simply polished with silver polish, it will work into a bright, satiny finish.

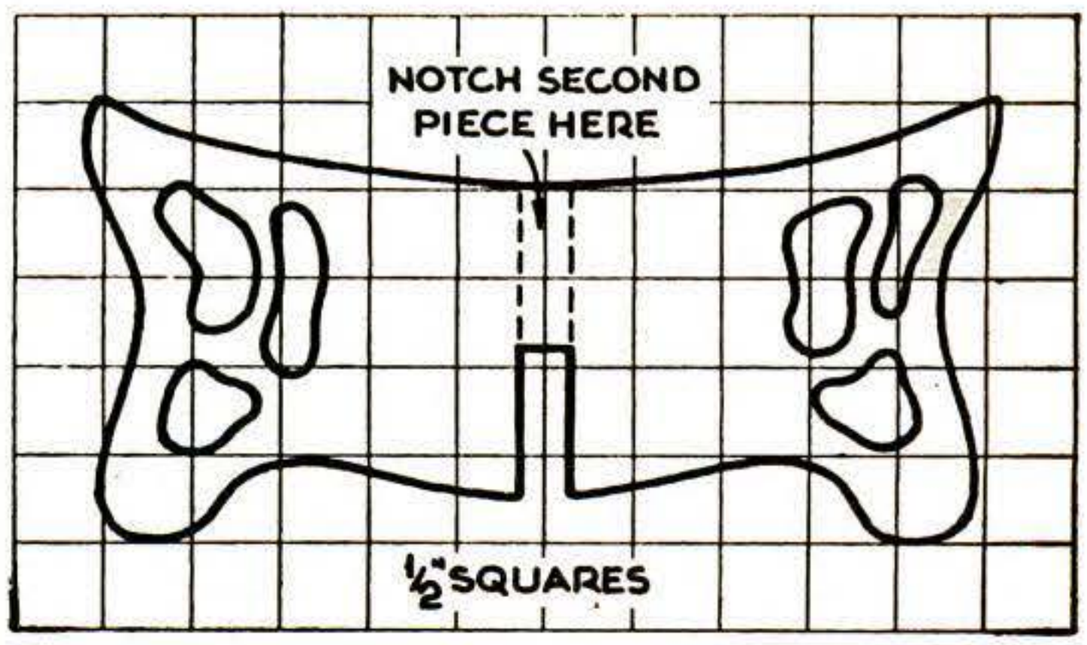
If you have no silversmith's tools, a ball-peen hammer can be used, but there will be less likelihood of dents in the surface if you use a short-handled mallet like the one shown in the photos. Turn the mallet head from maple or other hardwood, making it about 2½" diameter at the center and 4" long. One end should be fairly flat and the other round.

Use hardwood for the block on which to do the hammering and turn or gouge a spherical depression in one face. The block should be of a size large enough for conveniently working your largest bowl.

In cutting the ends of the cans for hammering, you can save the trouble of turning the edge by leaving the bead on the stock. Any size can may be used, even the ends or covers of large tin pails. Large bowls, however, require fairly heavy material.

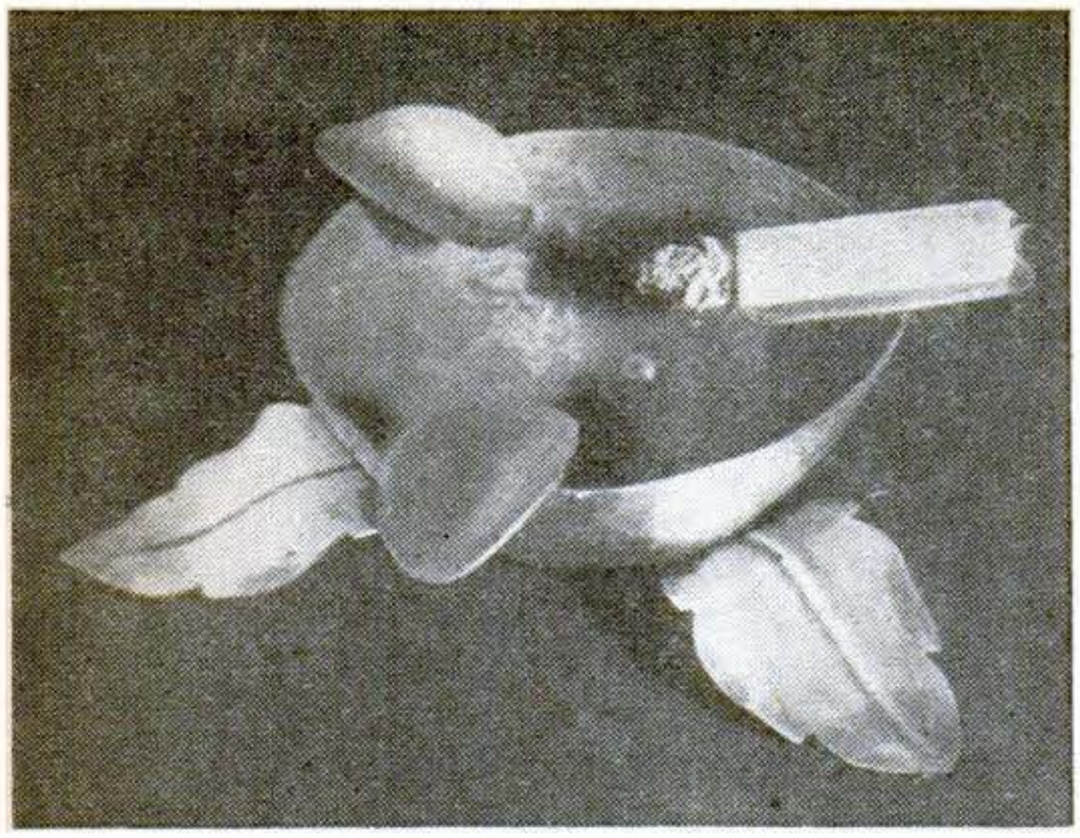
Hammer with the small end of the mallet. Because of the beaded edge, work from the center outward and repeat as often as necessary until the desired depth of the bowl is obtained. Then work over the piece with the broad end of the mallet to smooth out dents, hammering last on the flat side of the block.

Fluted edges are also hammered over the depression. A pattern for a wooden stand is shown below.—ELMA WALTNER.






Copyrighted material



## Hammered Copper Tray Has Legs of Bent-Leaf Design

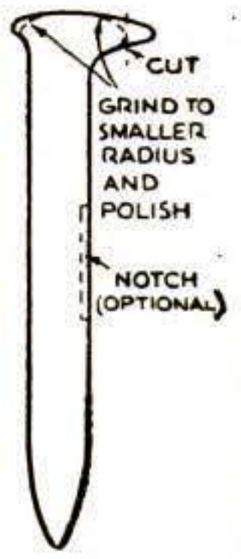
SCRAPS of light-gauge sheet copper from which you can cut a 3⅛" disk, three 1⅛" by 2" pieces, and three ⅞" by 1⅜" ovals are quickly shaped into an ash tray like that shown above. The bowl of the tray is hammered from the inside with a silversmith's raising hammer, as shown in the drawings. Hammer the disk over a 1/16" depression in a hardwood block working repeatedly from outside to the center. Anneal it several times by heating red hot and quenching in water.

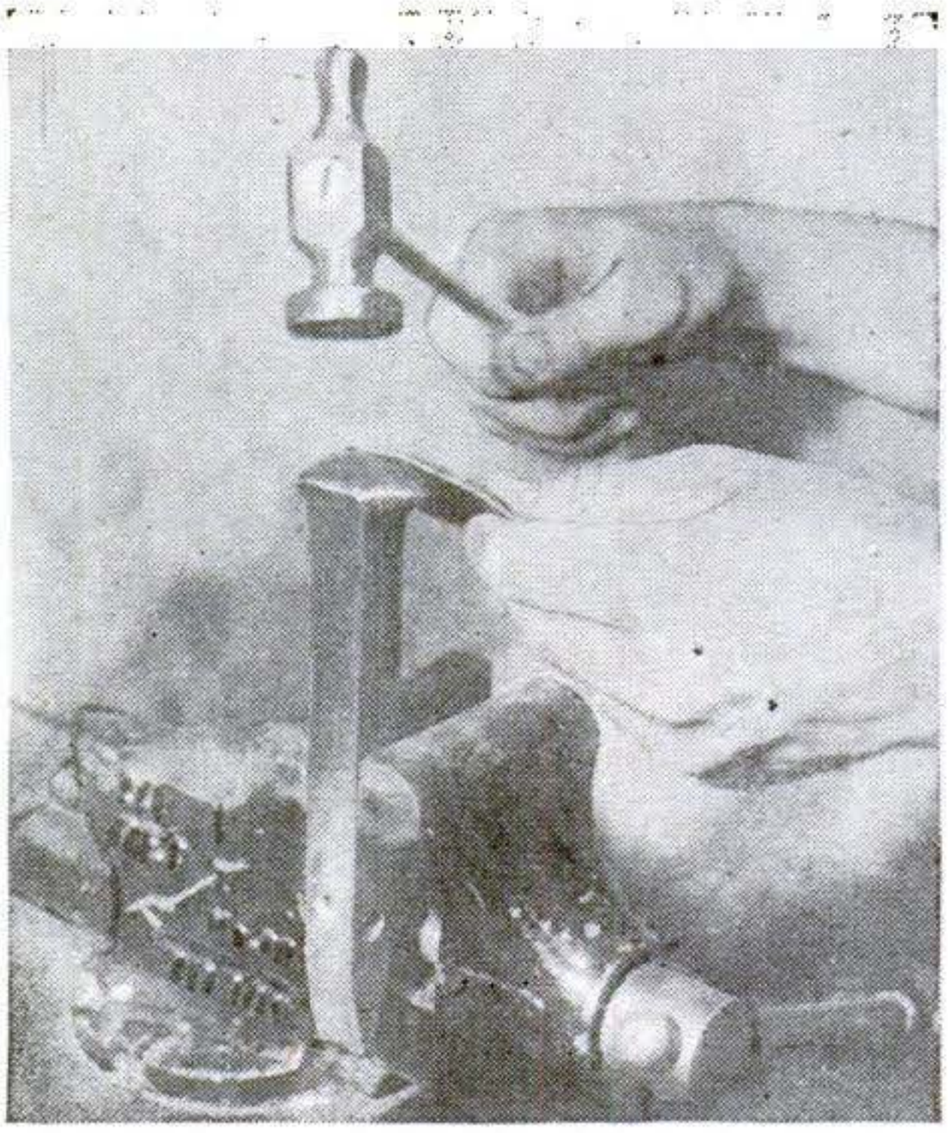
Set the tray on the bench bottom up and scribe around the edge with a scriber stapled to a block just thick enough to bring the scribed line above all edge irregularities. Then cut the edge to the scribed line and file smooth. Drill three holes for riveting on the legs and file notches for the three cigarette rests.

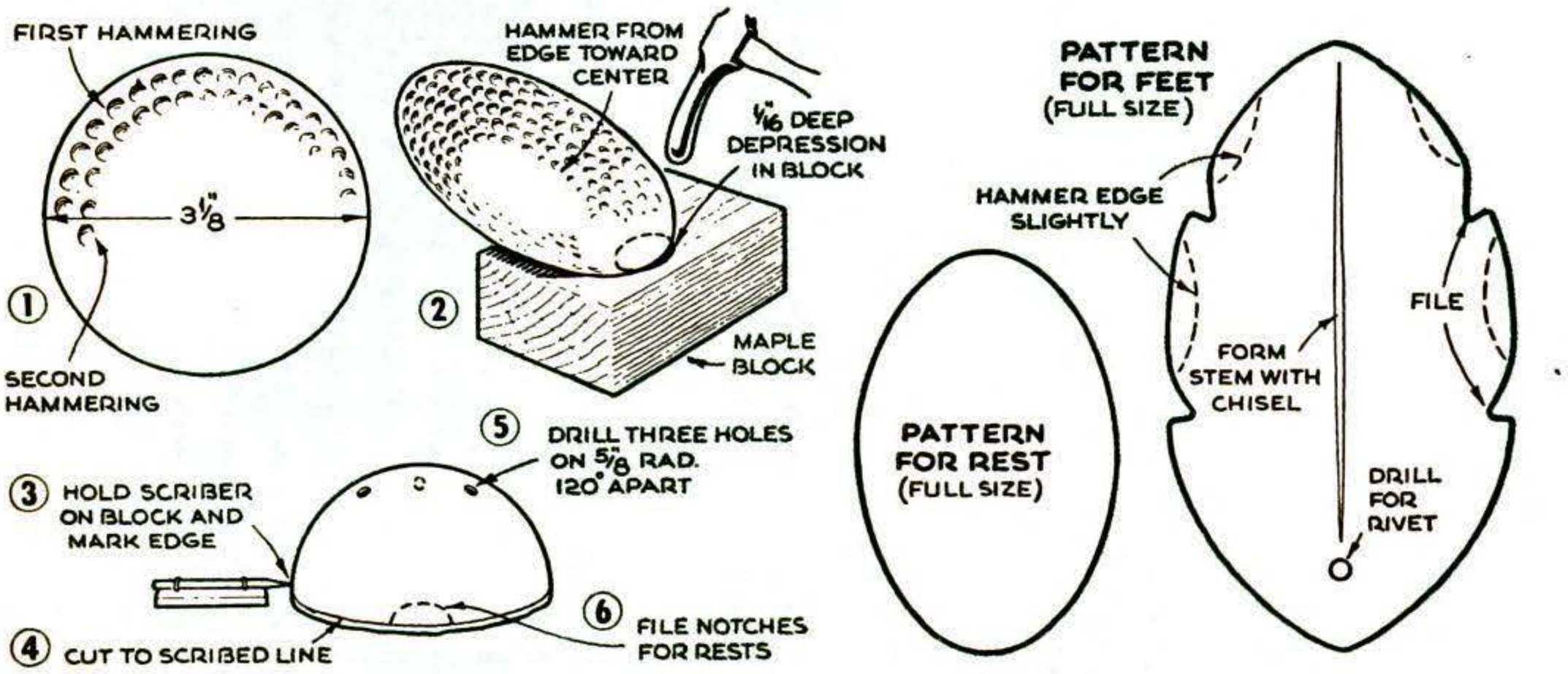
Cut out and shape the legs, rivet and solder them on, cut and shape the rests, and solder these in place. Polish and lacquer the piece.—H. W.

## Planishing Stake Is Made from Railroad Spike

Bring home the next discarded railroad spike you find lying along a right-of-way. You can cut and grind the head, as shown in the drawing, to make a planishing stake for hammering bowls too small for the usual planishing stake. The head should be spherical when you have finished grinding. Smooth with a fine file and polish with emery cloth. If the stake slips in the vise, notch the shank.—H. W.



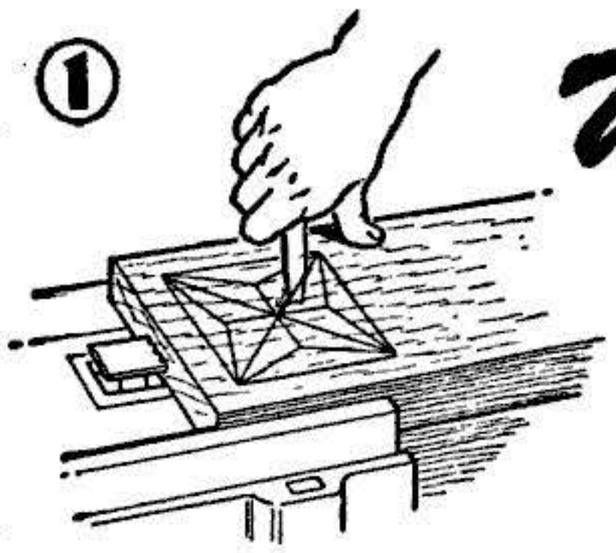




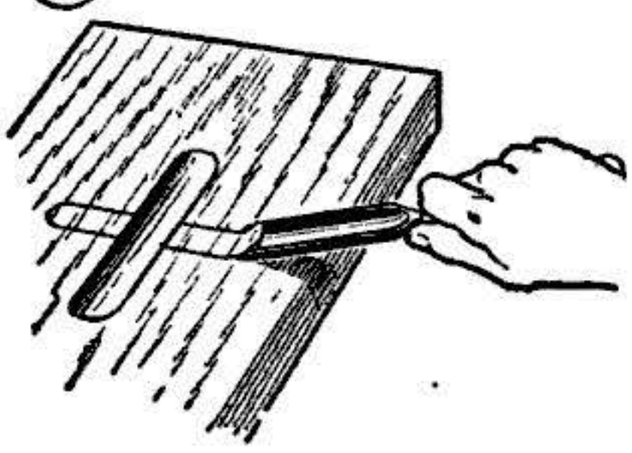

Copyrighted material

# What's Wrong?

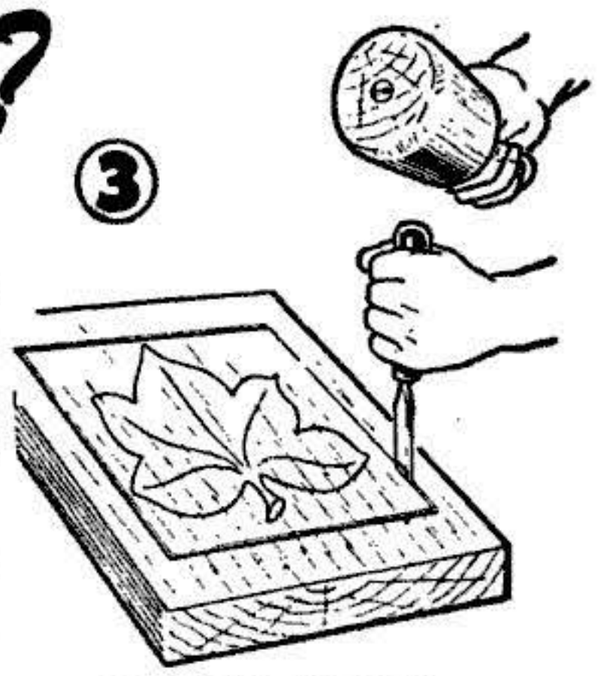
ANYONE who followed the recent series on wood carving in POPULAR SCIENCE can find these seven errors. Turn the page upside down to check your answers with those below.



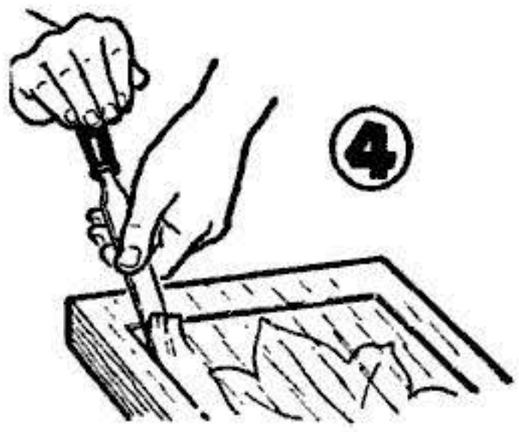
① STARTING A POCKET IN A CHIP CARVING



② CUTTING CROSSED FLUTES WITH A GOUGE



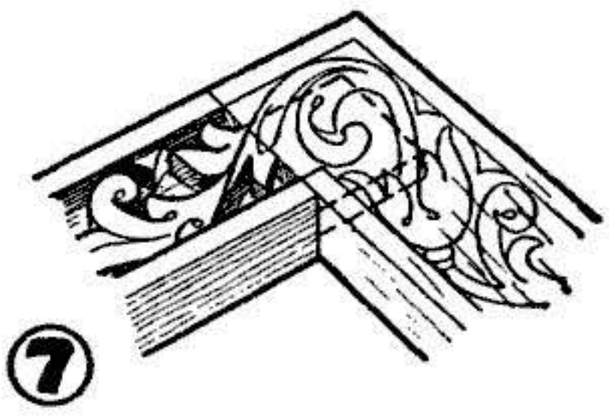
③ FIRMING IN THE OUTLINE



④ ROUTING OUT THE BACKGROUND

⑤ FINISHING THE ROUNDED END OF A FLUTE

⑥ VEINING A LEAF IN AN UNFINISHED CARVING



⑦ A TENONED-FRAME CARVING WITH A ROUTED BACKGROUND

**ANSWERS:** 1. Stop cuts should be stabbed with the knife truly vertical, and should raise no chip.

2. Cut the first flute across grain so the gouge won't splinter the edge when it is being crossed.

3. Place the chisel 1/32" to 1/16" inside the line to allow for crushing and the trimming cuts.

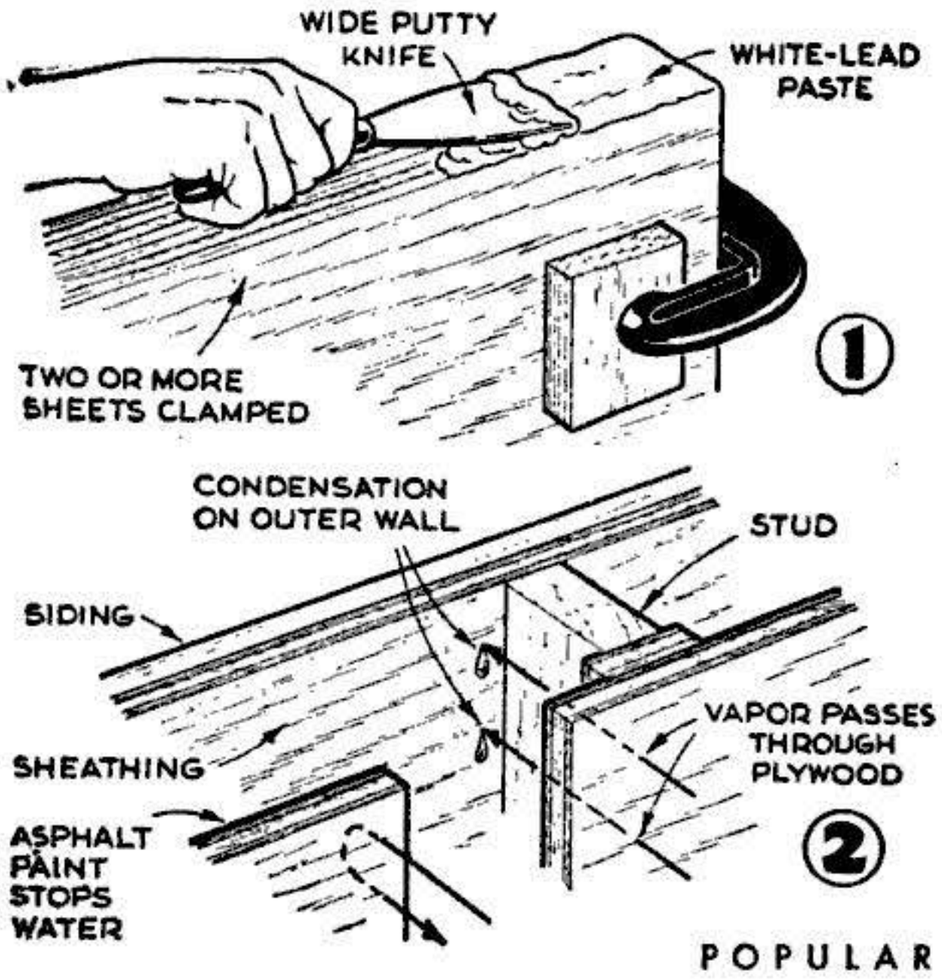
4. Use a gouge for rough routing. A chisel should have the bevel on the underside.

5. Cut flutes toward the center from both ends.

6. Instead of finishing one part completely, firm in the whole carving, and then bost it, carrying each stage over the whole piece.

7. This style is too deep for the frame. It will cut into the tenon.

## MOISTURE-SEALING PLYWOOD [WOODWORKING]




**Condensation control.** During cold weather water vapor inside a room passes through plywood wall lining and condenses as moisture against the cold outer sheathing or siding. Especially in homes heated by gas, sufficient moisture may collect inside the wall to drip, sometimes wetting mineral wool or other insulation and nearly nullifying its insulating value. This is largely prevented if two coats of asphalt or aluminum paint are applied on the backs of the panels before installation. (Fig. 2). Glossy-surfaced asphalt-impregnated paper weighing 50 lb. per 500 sq. ft. is nearly as effective. Outer sheathing or siding should not be back-painted, for this further retards passage to the outside of any water vapor that might pass through the inner panels. Ventilation is an aid in condensation control.

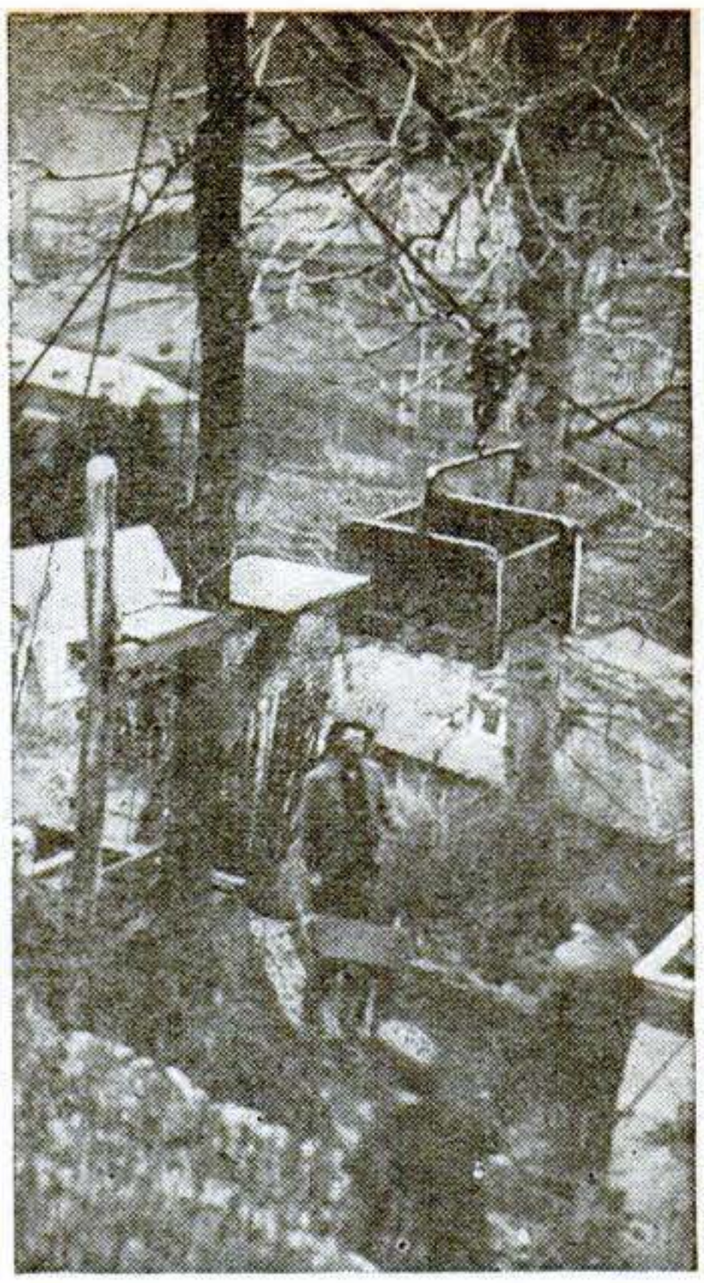
**Edge sealing.** Plywood exposed to weather or humid conditions should be edge-sealed, as in Fig. 1, by application of white-lead paste or a suitable resin paint.

**Exterior surfaces.** Exterior plywood may be obtained ready-sealed, or it may be sealed with ordinary resin sealer. Standard painting practice, such as three coats of good-quality outside oil paint, is suitable. Textured finishes compounded of asbestos and silica with resin-base paints are also serviceable.

POPULAR SCIENCE MONTHLY SHOP DATA



Copyrighted material



Having a coal mine in his back yard (see PSM, Jan. '46, p. 146) W. B. Swope didn't have to worry about getting fuel up the long hill, left, from the street to his house. When the mine ran out, he built a cable hoist capable of carrying 600 lb. at a time.

## Cable Hoist Carries Coal to Inaccessible Mountainside Home

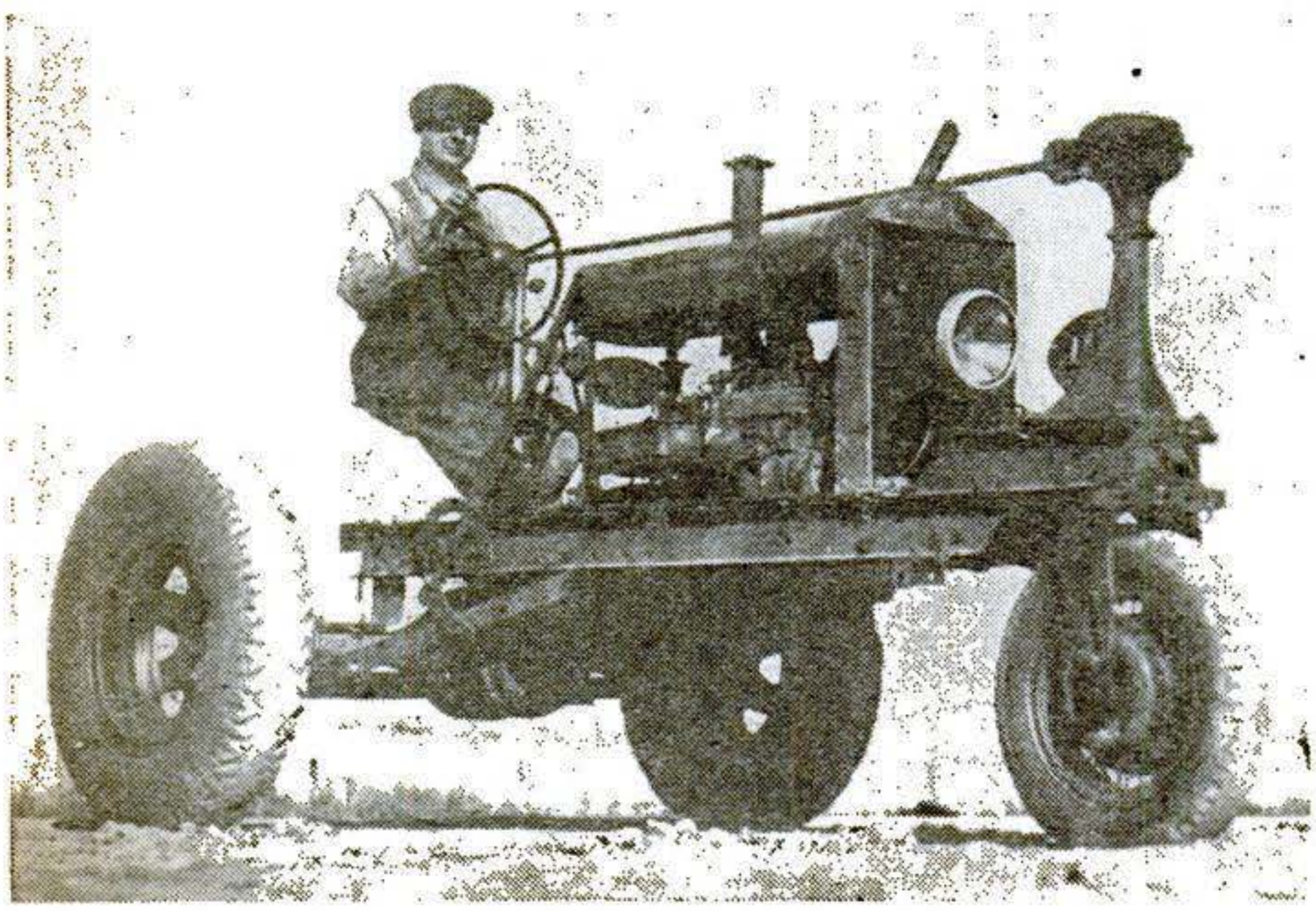
IN MOUNTAINOUS Welch, W. Va., a small army of carriers was needed to haul a season's supply of coal 400′ up a steep mountainside from the street to the home of W. B. Swope. The pictures above show the hoist that Mr. Swope installed to solve his carrying problem.

Traveling on an incline down the hill, the bucket hits a stop and drops into the truck. After filling, the bucket is lifted out of the truck by a double-groove snatch block, and then engaged on the carrier cable for the long ascent. A four-man crew can move two tons an hour. The hoist also comes in handy for carrying furniture, groceries, and other heavy loads to the house.

## Farmer Builds Tractor from Old Automobile and Truck Parts

SHORTAGES of almost everything except automotive junk and ingenuity led Albert B. Mrachek, of Alexander, N. D., to combine the two things he had plenty of. The result is this versatile three-wheel tractor, capable of pulling two plows, cultivating grain, or moving quantities of soil.

If the machine could trace its assorted ancestry, it would name, among others, a Universal tractor, a Whippet truck, a Chevrolet, and Ford cars from T to V-8.—LEO HARRIS.



**ANSWERS TO CAR QUIZ**
*on pages 112-113*

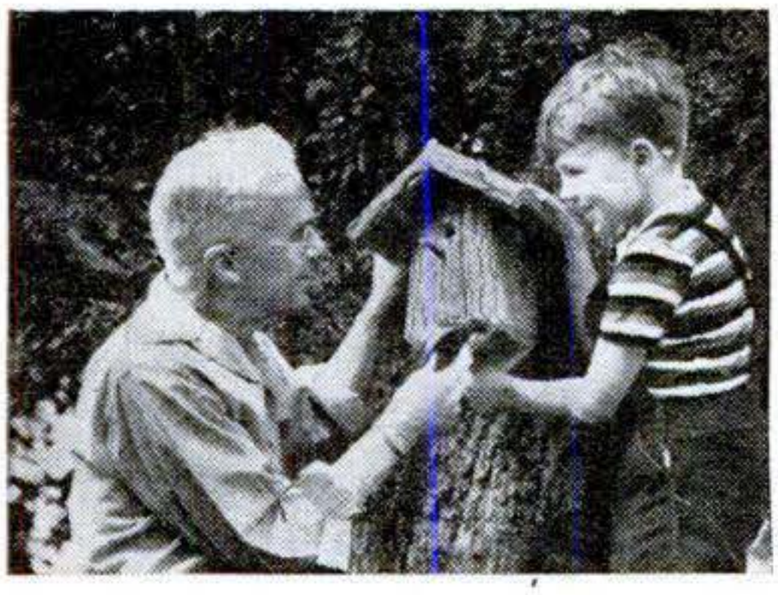
**1. Nash; 2. Packard; 3. Ford; 4. Fooled you. This exists only on paper. 5. Pontiac; 6. Hudson; 7. Studebaker Skyway Champion; 8. Chevrolet; 9. Kaiser; 10. Willys "Jeep;" 11. Mercury; 12. Chrysler Royal.**



Copyrighted material

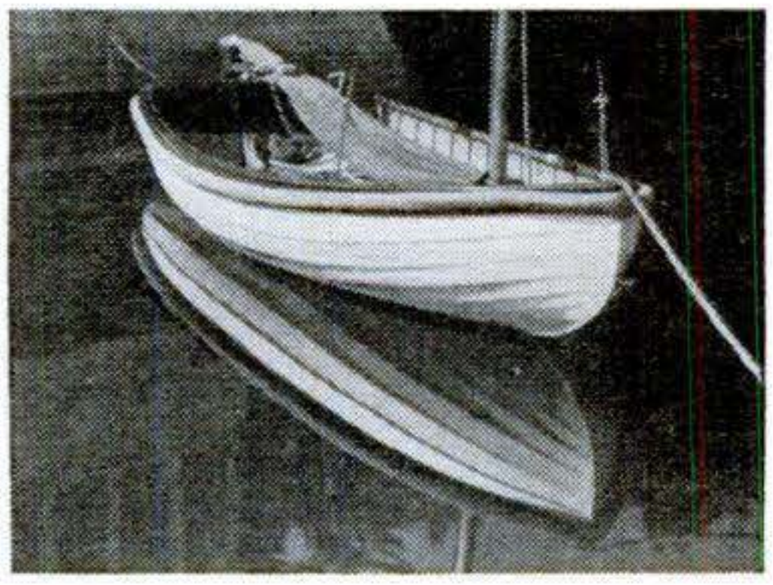
# First step to a finer picture . . .
# the right Kodak Film

## This summer you'll again have a wide choice — *for example . . .*



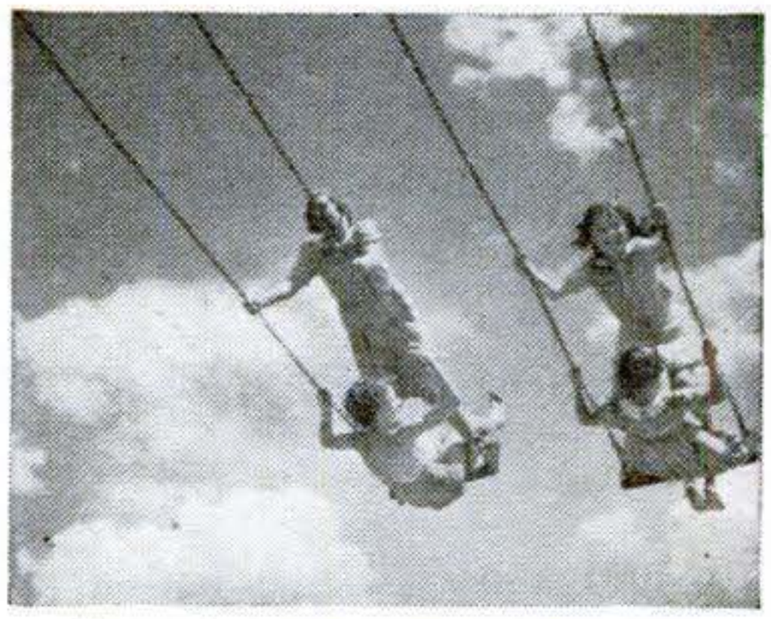
**KODAK VERICHROME** (rolls, packs) — America's favorite snapshot film by a wide margin.

**KODAK PLUS-X** (rolls, packs) — all-round "pan" film; combines high speed, fine grain.

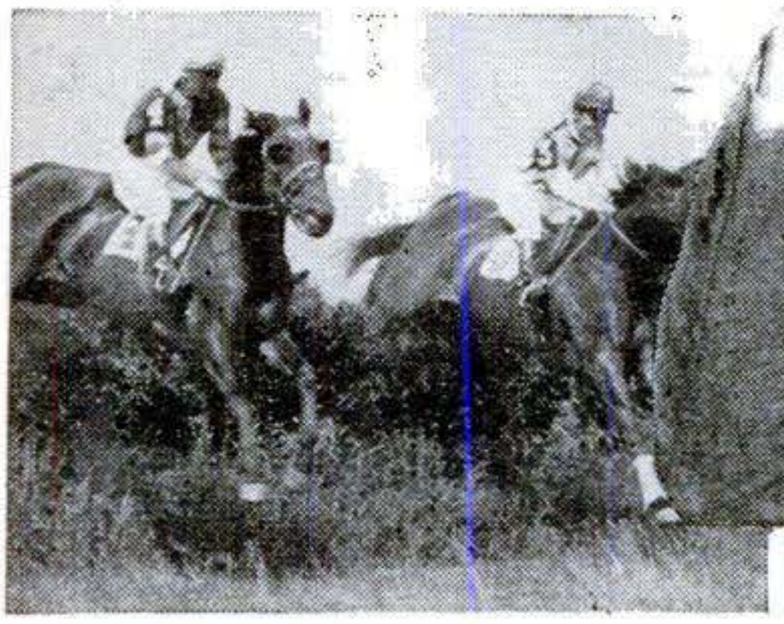


**KODAK PANATOMIC-X** (sheets, miniature rolls) — extremely fine grain, for *big* enlargements.

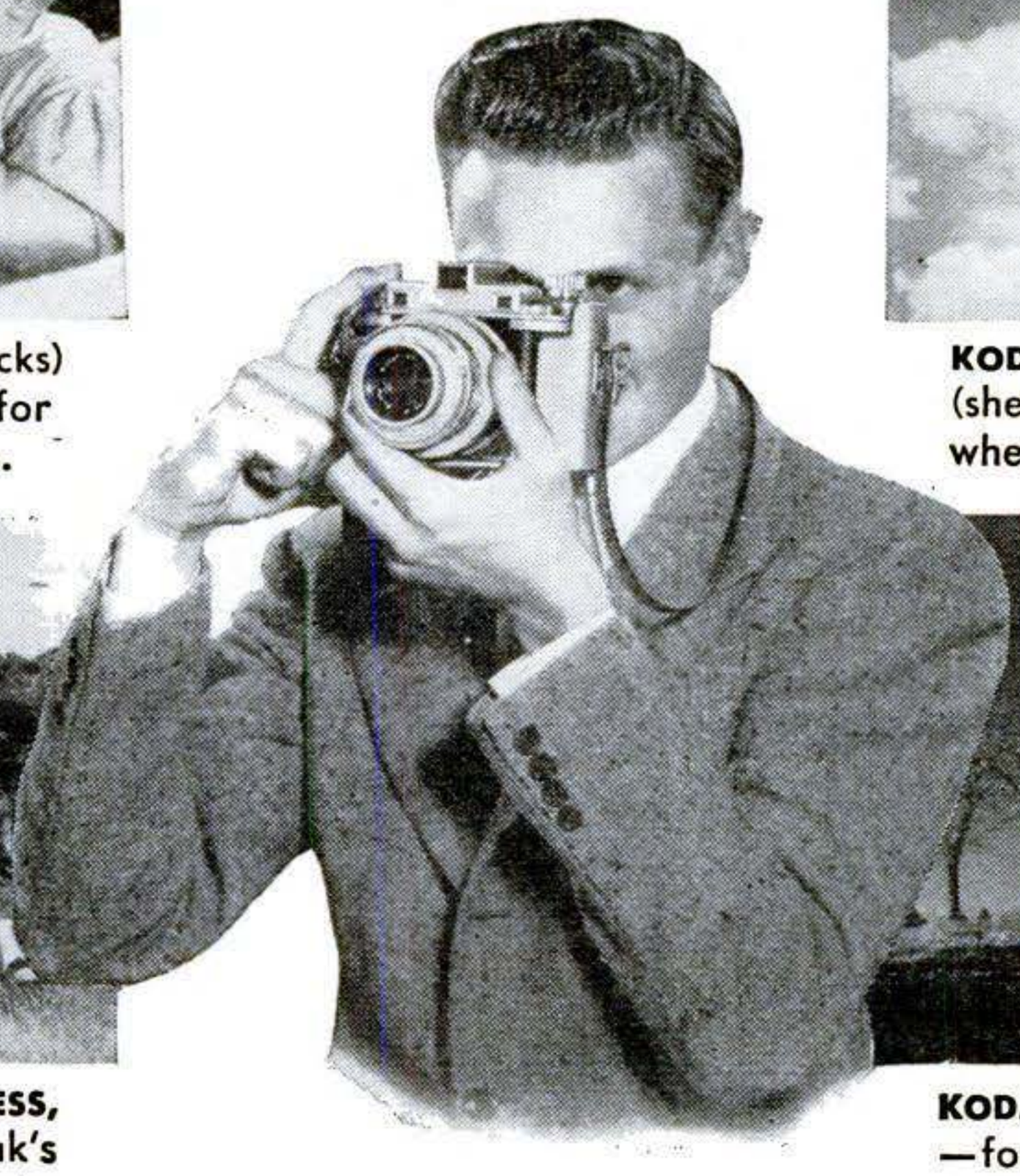
**KODAK SUPER-XX** (rolls, packs) — favorite high-speed film for both outdoors and indoors.



**KODAK TRI-X PANCHROMATIC** (sheets) — very fast; excellent when exposures must be short.



**KODAK SUPER PANCHRO-PRESS, SPORTS TYPE** (sheets)—Kodak's fastest—for tough sports shots.



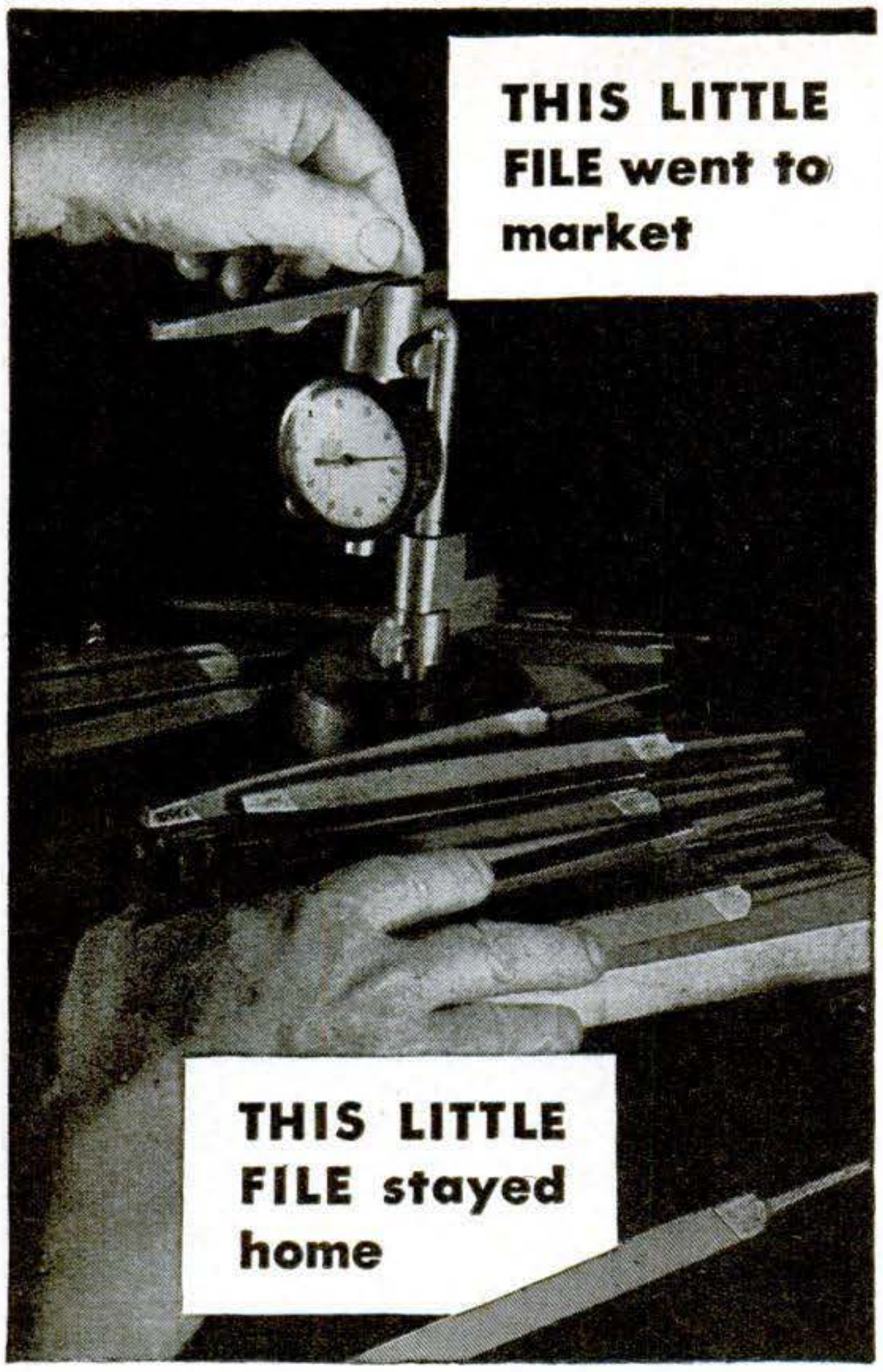
**KODAK INFRARED** (rolls, sheets) — for dramatic effects; cuts through haze.

At your Kodak dealer's . . . Eastman Kodak Company, Rochester 4, N.Y.

Kodak



Copyrighted material




THE little files that "go to market" under the world-famous Nicholson and Black Diamond trade-marks are only those which can uphold the long-standing Nicholson guarantee of *Twelve perfect files in every dozen.*

Those which "stay home"—the rejects—are the few which fail to pass the score or more of meticulous tests and inspections that guard the various manufacturing stages.

The testing operation illustrated above is one of many. Here, triangular files are being checked, one by one, with a dial gauge to see that edges are uniformly correct in width.

The mechanic who asks the boss for Nicholson or Black Diamond brands shows that he knows files—and, most likely, that he is a worker of high talents.

***FOR REPAIR SHOP, HOBBY SHOP, HOME OR FARM,*** *get Nicholson or Black Diamond files from your hardware dealer. For information on kinds, use and care of files send for free book,* **"FILE FILOSOPHY"***—48 interesting illustrated pages.*

NICHOLSON U.S.A. **NICHOLSON FILE CO.**
**19 Acorn St., Providence 1, R. I.**
*(In Canada, Port Hope, Ont.)*

BLACK DIAMOND TRADE MARK

**NICHOLSON FILES** *FOR EVERY PURPOSE*


# GRAVEST ILLNESSES are tasks for atomic research

(Continued from page 96)

often than not they are low; the build-up of radioactivity in the feet is too slow. The curves, of course, do not present a complete clinical picture. The counts may be deceptively raised, for example, by such conditions as fluid in the tissues (edema or dropsy), even though the circulation has actually been impaired. The physician has to interpret the findings. But the technique gives him an impersonal assessment of the circulatory situation, and thus represents an important advance in the handling of a group of painful, disabling, and often fatal conditions.

In another form this technique has been developed at the University of California for the diagnosis and study of vascular diseases like hardening of the arteries, trench foot, and Buerger's disease. Tracer studies have been made on experimental animals, which were allowed to breathe krypton, one of the "noble" gases—so called because they form no compounds. The gas had previously been rendered radioactive in the cyclotron. The build-up of radiation in the extremities was measured with the Geiger counter. The effect on the circulation of drugs such as adrenalin and histamine has also been studied.

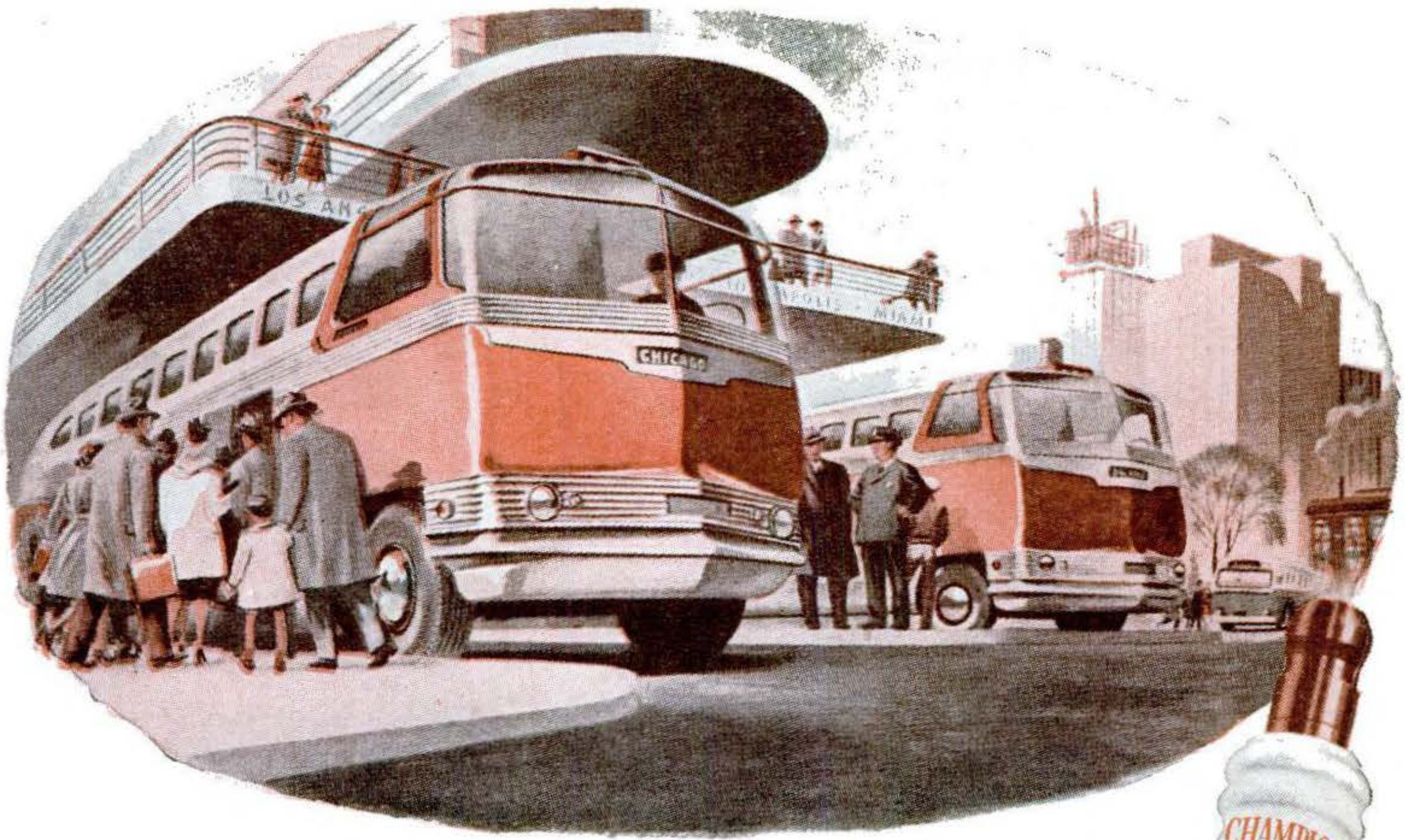
If the leucocytes or white corpuscles of the blood get out of control, a person may suffer from leukemia. It is a circulating form of cancer. Leucocytes are necessary; they fight infection and have many other important and complex regulatory functions. But not many are necessary; in normal blood there is only one white corpuscle to every 500 or 1,000 of the red. In leukemia, the white cell count increases out of all proportion, and at the same time the cells fail to mature properly. The blood can no longer do its job of nourishing and repairing the tissues and carrying off their waste products. It is as if the military police set out to run the army. Acute leukemia is very difficult to control. In chronic leukemia there is more hope, but nothing that can be called a cure has yet been found. Benzene and arsenic have been used, but in recent years the principal reliance has been on X-radiation. This usually dampens the exuberance of the leucocytes, but eventually the dosage required is so high that the body can no longer tolerate it. The physician has to steer a precarious course. With proper dosage, however, the span of comfortable

(Continued on page 214)



Copyrighted material

# Why Bus Lines specify Champion Spark Plugs



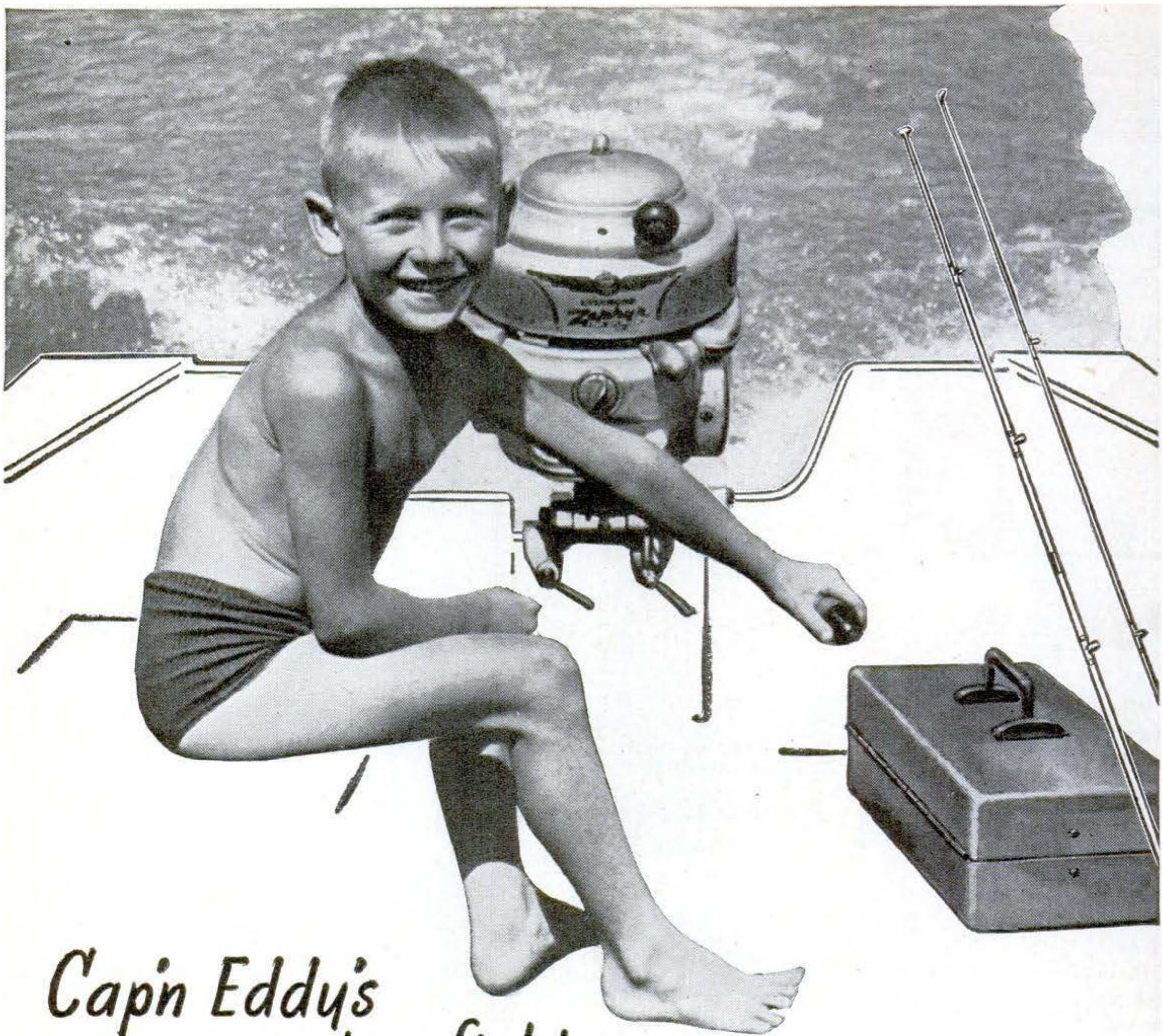

## THEY'RE DEPENDABLE!

**The bus lines of America are indispensable to our transportation system. They are experts on maintenance of equipment because efficiency and economy are absolute essentials to success in their business—no factor is too small to escape detailed study. That is why most bus lines with the best maintenance records specify dependable Champion Spark Plugs. This is another example of preference for Champions by experts—substantial evidence that they're better for your car. Champion Spark Plug Company, Toledo 1, Ohio.**

**FOLLOW THE EXPERTS . . . DEMAND DEPENDABLE CHAMPIONS**



Copyrighted material



# Cap'n Eddy's going fishing . . . .

Cap'n Eddy may seem a bit youthful to be skippering all that horsepower! But Eddy agrees with his dad . . . it's a sound idea to start 'em young!

So Eddy is "an old hand" with Evinrudes, and revels in all the pleasures that go with them. A lot of happy miles have foamed in his wake, he has baited many a hook and "boats" his fish like an old-timer.

In thousands of family albums there are snap shots such as this one of Eddy*. Photographs of children running Evinrudes capably, easily, joyfully.

Each picture is a forthright testimonial to an Evinrude quality that users prize above all others. *The assurance of carefree performance,* even in a youngster's hands. *Performance* that has been perfected step by step during 36 years of building fine outboards . . . trustworthy *performance* that is mechanically *built right in,* ready to go and *keep on going!*

It's waiting for you — see your Evinrude dealer! Look for his name under "Outboard Motors" in the classified section of your phone directory. Write for catalog of the complete Evinrude line. Address, EVINRUDE MOTORS, 5266 North 27th Street, Milwaukee 9, Wisconsin.

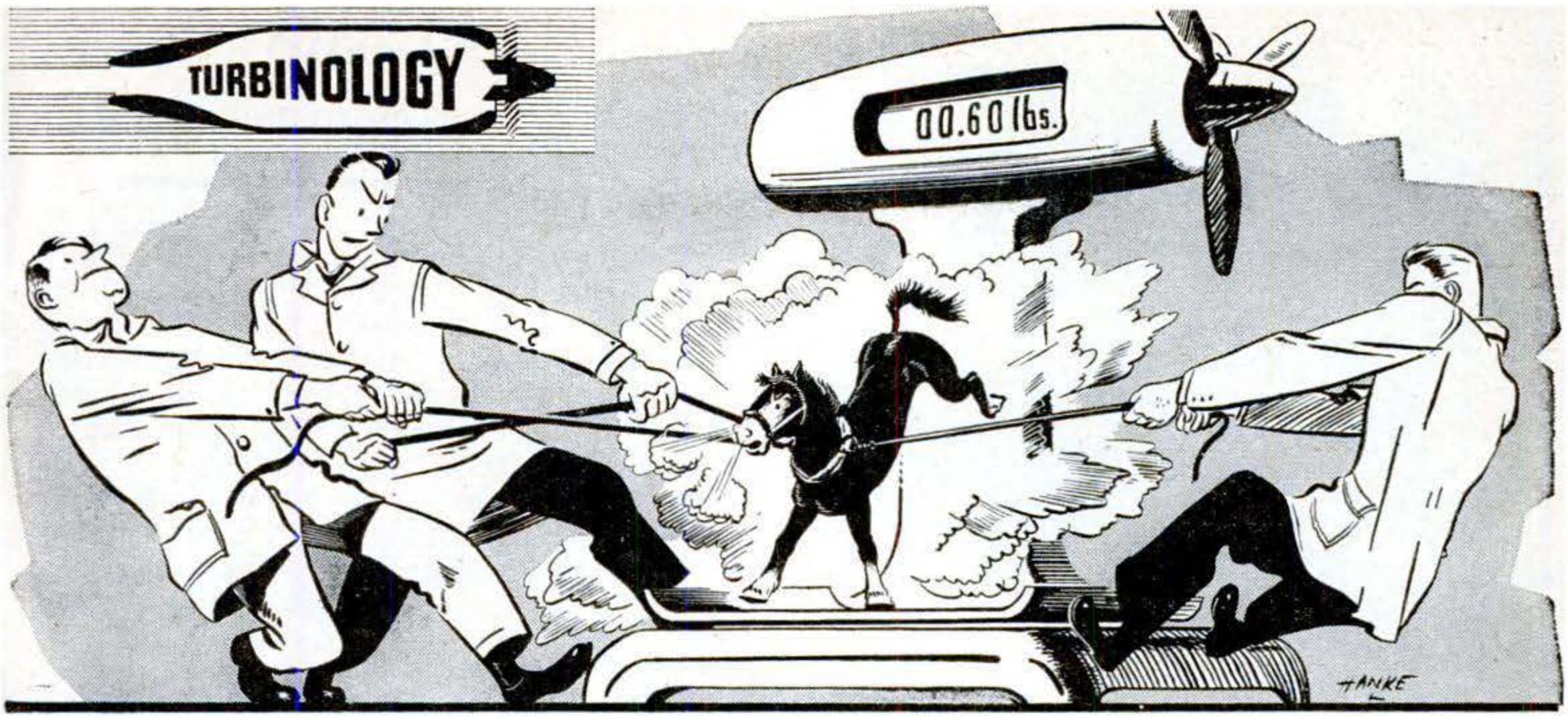
*In Canada, Evinrude Motors, Peterboro, Ontario.*

**EVINRUDE**
OUTBOARD MOTORS

**Eddy Ogrodowski of Toledo, Ohio.*



Copyrighted material




# Pony-Weight Horsepower

When a plane is described as being 200,000 pounds in gross weight, this figure includes not only the weight of the plane but all of its load of gasoline, oil, crew, passengers, mail, and cargo.

If the plane structure is "heavy", the useful load is light. If its engines are gas hogs, more fuel and fewer passengers go aboard. And if the engines are heavy for the power they deliver, still more potential load remains on the ground.

The champion of all reciprocating engines for weight-per-power is the Cyclone 9, first engine to weigh less than a pound per horsepower. It delivers 1,425 horsepower but weighs only 1,352 pounds, or 0.95 of a pound per horsepower. Most engines run over a pound per HP, especially in the high output types.

Now there is another champion, in a new power field. The Wright propeller turbine has made the sharpest of all cuts in weight, while at the same time doubling the power of the Cyclone types. Within a short time, Wright turbines will deliver many times the power of the Cyclone 9 at a weight of only 0.60 of a pound per horsepower. It will make a difference of hundreds of thousands of dollars in airline revenue and will mean lower passenger fares and cargo rates.

On a two-place training plane, the difference between 0.95 and 0.60 of a pound per HP is not a major one. Maybe about a dozen pounds. But on the new air giants taking off with as much as 30,000 HP, the difference is tremendous. A plane with this much power from ordinary type engines would have to carry over 30,000 pounds in engine weight. But Wright turbines of equal power, would only weigh 18,000 lbs.

Much of the weight saving in the Wright turbine comes from its sheer simplicity. There are just two main moving parts: the air compressor and the turbine wheel, plus gears to slow down the turbine speed to efficient propeller speed. Eliminated are the individual cylinders, pistons, valves, connecting rods, crankshafts and counterweights, cams and intricate gear trains. In the four Cyclones of a B-29, there are 144 spark plugs while the turbine has but three per engine.

The turbine is well balanced and needs no counterweights. Turning continuously, with no pistons moving up and down, it does not set up strong vibrations and thus uses a lighter housing than engines of equal power.

These figures on weight savings, and what they mean in terms of payload, are only one of the reasons why the giant planes to come are being designed for Wright propellor turbines. And these figures are just one more indication of the way Wright Aeronautical engineering produces better aviation power for all types of aircraft.

**WRIGHT**
**AIRCRAFT ENGINES**
DIVISION OF
CURTISS WRIGHT
FIRST IN FLIGHT
*Wright Aeronautical Corporation • Paterson, New Jersey, U.S.A.*



Copyrighted material

Home Craft Sets are supplied either in the steel case illustrated or mounted on a panel which can be hung beside the lathe.

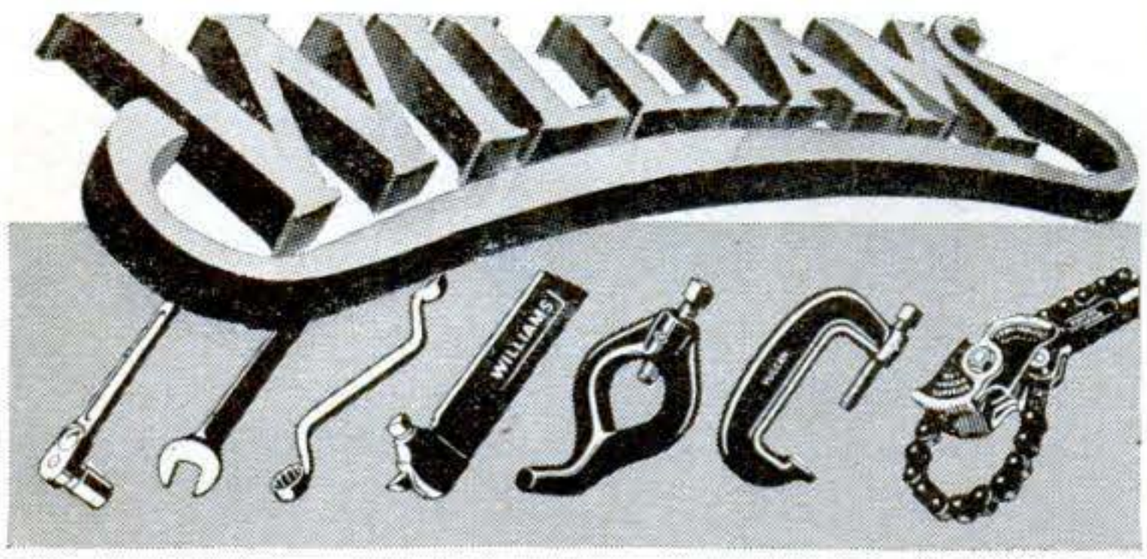
**WILLIAMS**

***Home Craft***

**TOOL HOLDERS**

● This set of 8 tool holders provides for all regular lathe operations and is ideal for home work shop use on lathes from 7 to 10" swing. Drop-forged from tough steel, accurately machined and specially heat-treated, these holders represent the same fine quality as the Williams industrial line. The high-speed steel cutters furnished, are ground, ready for use except those for turning. The "diamond-point" turning cutters require only a minimum of grinding to desired form. Sold by Industrial Distributors everywhere. Write Dept. S-56 for literature.

**J. H. WILLIAMS & CO.**
**BUFFALO 7, NEW YORK**




**DROP FORGINGS AND DROP-FORGED TOOLS**


# GRAVEST ILLNESSES are tasks for atomic research

and active life can be considerably extended.

Radiophosphorus was first tried in 1936. Much of the work in this field has been done at the University of California by Dr. J. H. Lawrence and his co-workers. (Don't confuse Dr. J. H. Lawrence with his brother, Dr. E. O. Lawrence, the cyclotron man, of the same institution.) The idea was to get a radioactive substance into intimate contact with the rampant leucocytes, so that they would be strongly irradiated, the rest of the body less so. The results are about equivalent to those secured with X rays.

More recently radiosodium has been substituted for phosphorus. Radiosodium expends its energy in about as many hours as radiophosphorus takes days, and on this account dosage is more readily controlled. The results have not yet been reported, but at any rate one more radioactive substance has reached the therapeutic stage.

Another disease, *Polycythemia Vera*, is leukemia in reverse; it is the red cells that get out of hand. Radiophosphorus also has been used in its treatment. The results have been distinctly encouraging, but since the disease is rare not many cases have been treated.

We can usually cope with disease caused by invasion of the body, or failure of some organ to do its job. At least the problem is specific: kill the invading agent, supply the deficiency. In cancer the strategic situation is less favorable. Cancer is not war, but revolution. It may be regarded as a kind of perversion of a process necessary to life, the process of growth. Cancer cells are different from normal cells, but the two resemble each other more than they differ. Normally there is some control, the nature of which is still obscure, which keeps the cells growing at the right pace and in the right places. When this control fails in a particular organ or tissue, we have a tumor of *neoplasm*. If the tumor is malignant, capable of spreading or *metastasizing*, then we have cancer. But the opposite number of cancer is not normal growth. It is the death of tissue through inability to multiply and maintain the physiological status quo. Health consists in maintaining a balance between the two extremes.

It is highly improbable that we shall ever achieve a cancer "cure" in the medically illiterate layman's sense of something that comes in a bottle. But this does not mean

(Continued on page 218)



Copyrighted material

# How to CHANGE A TIRE AT NIGHT...

## *More Quickly—More Safely!*

**1** Most any motorist can change a tire. But few can change it at night with top speed, efficiency —and *safety!* Night-time tire-changing can be hazardous — but a little care and an "Eveready" flashlight can reduce the danger. First principle, says the American Automobile Association, is . . .

**2** Park *off* the highway, if at all possible. Next best place is on a *straight* stretch of road where you can be seen for at least 500 feet. If you *must* park on a curve, a light should be set on the road some distance back. Be sure neither you nor a bystander blocks off the view of your tail-light!

**3** Keep all your tire-changing tools tied or boxed *together,* where you can pick them up without searching or fumbling. Remove your spare before jacking up car — tugging at it later might push car off jack. If alone, set flashlight on a stone in convenient position.

*For*

**EXTRA POWER, EXTRA LIFE —AT NO EXTRA COST**

**4** In your car or at home—wherever you need a flashlight—rely only on "Eveready" batteries. For "Eveready" batteries have no equals . . . that's why you'll find them in *more* flashlights than any other battery in the world! Now that they're available again, there's no need to accept a substitute!

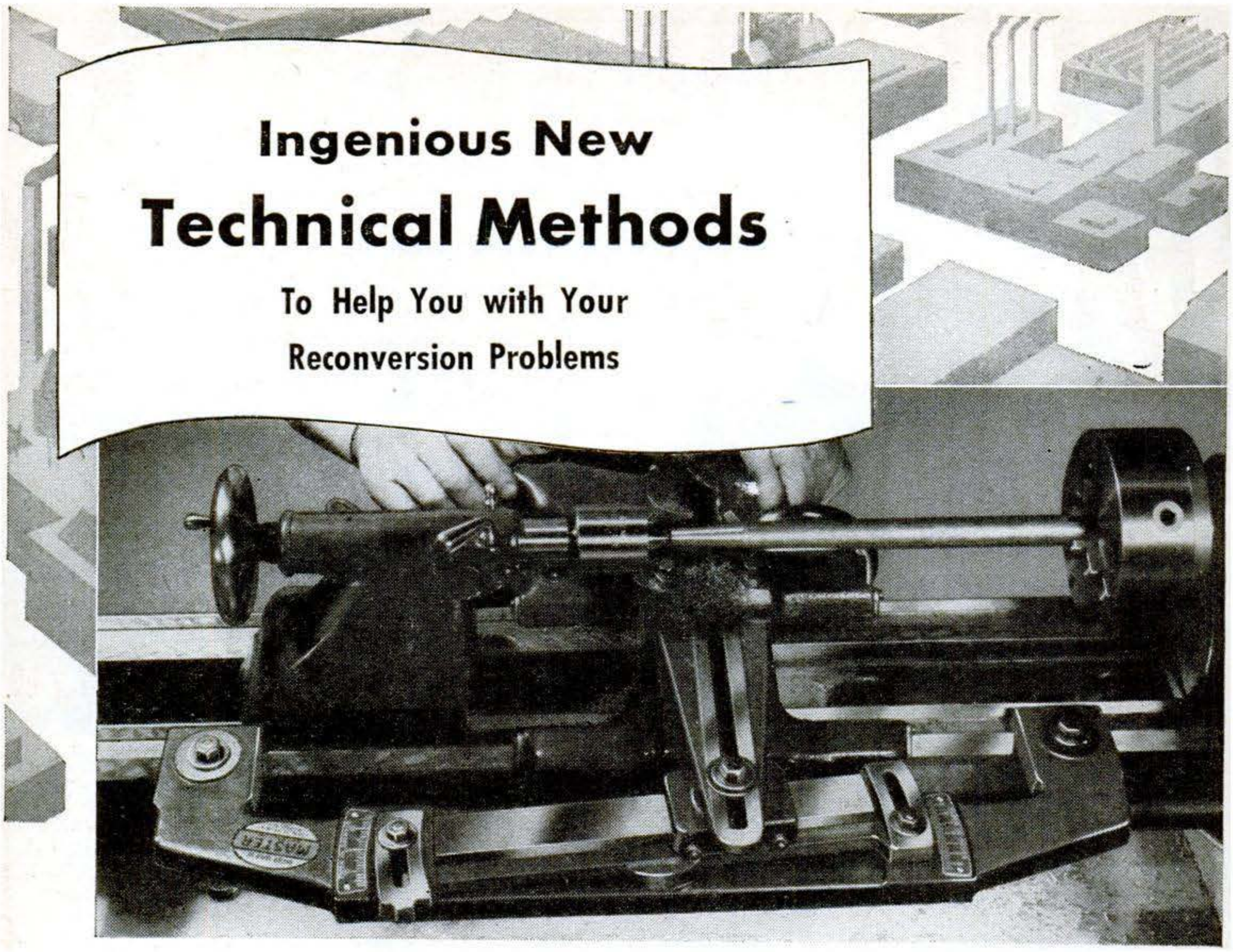
**NATIONAL CARBON COMPANY, INC.**
30 East 42nd Street, New York 17, N. Y.
*Unit of Union Carbide and Carbon Corporation*
UCC

**EVEREADY**
TRADE-MARK

*The registered trademark "Eveready" distinguishes products of National Carbon Company, Inc.*



Copyrighted material




# Simplified Master Taper Attachment Fits All Types of Lathes Instantly!

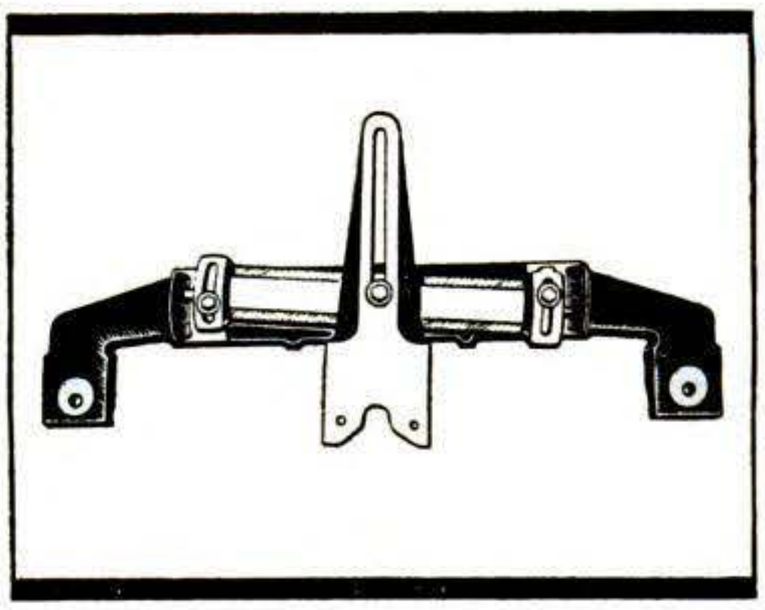
**Now! A "universal" taper attachment** that fits all lathes, old or new, big or small—that can be attached or removed in *minutes!* This taper attachment is not bulky or cumbersome. It bolts easily to the bed, in the back of any lathe.

**The Master** performs accurate taper turning, boring and threading with the ease of any straight line tool operation. It precisely duplicates any tapered part. Is usable in any position. Does not interfere with straight turning. The bar is precisely machined and fitted. There is no vibration. Taper graduations are in inches at one end; degrees at the other. The Master is available now, in two sizes; two feet and four feet in length.

**Available today** also, is delicious Wrigley's Spearmint Gum. This is one treat you can enjoy even when your hands are busy. And the pleasant chewing helps to keep you alert and wide-awake, even through a monotonous job.

Chewing Wrigley's Spearmint satisfies a fellow. In addition, it helps keep your mouth moist and fresh—so you feel better. And feeling better, you naturally work better. By making chewing gum available to all, scores of plants and factories report increased morale and efficiency that really pays off.

*You can get complete information from the Keene Electrical Machinery Co. 549 W. Washington Blvd., Chicago 6, Ill.*



**Model 710 Master Taper Attachment**

AA-67



Copyrighted material

# GO MORE PLACES FASTER *IN AERONCA!*

***AERONCA has brought a new and better way of living to thousands of people just like you!***

**Aeronca Champion** (Illustrated) is a 2-seat tandem type plane. Large, roomy cabin. Unusually fine visibility. Thrilling performance.

**Aeronca Chief,** also in production, is a de luxe 2-passenger model with side-by-side seats. Cruising range of 420 miles. Controls are free, sturdy.

**1. Commute by Air!**

Many Aeronca owners live in the country and commute regularly to their jobs in town. A barn serves as hangar. You can land and take-off on a small field.

**2. 500 Mile Trips!**

You can travel hundreds of miles—in a few hours. Take in football games, other sports events. Go so many places. And, there's no "traffic problem" in the sky.

**3. Use it in Business!**

Executives and salesmen use Aeronca to cover territories faster. Fewer nights on the road, more time at home.

WOULD you like to spend a few days at the seashore . . . re-visit your favorite fishing haunt . . . see friends who live a few hundred miles away? You can get there quickly—in Aeronca! It's not only a new way to travel . . . it's a new way to live.

Aeronca has built a new plane, designed for average people. It has made flying simple—*and economical!* It's so easy to fly . . . thousands learn to fly solo in 8 hours or less. It brings plane ownership within reach of thousands who have never flown before. Two thrilling new Aeronca models are now in production. Both offer new room, comfort and luxury. Many extra value features you won't find in other planes at Aeronca's price. See your Aeronca dealer.

**Aeronca Aircraft Corporation**
**Middletown, Ohio**

**So Safe—So Simple—Now**

**ANYBODY CAN FLY AERONCA!**

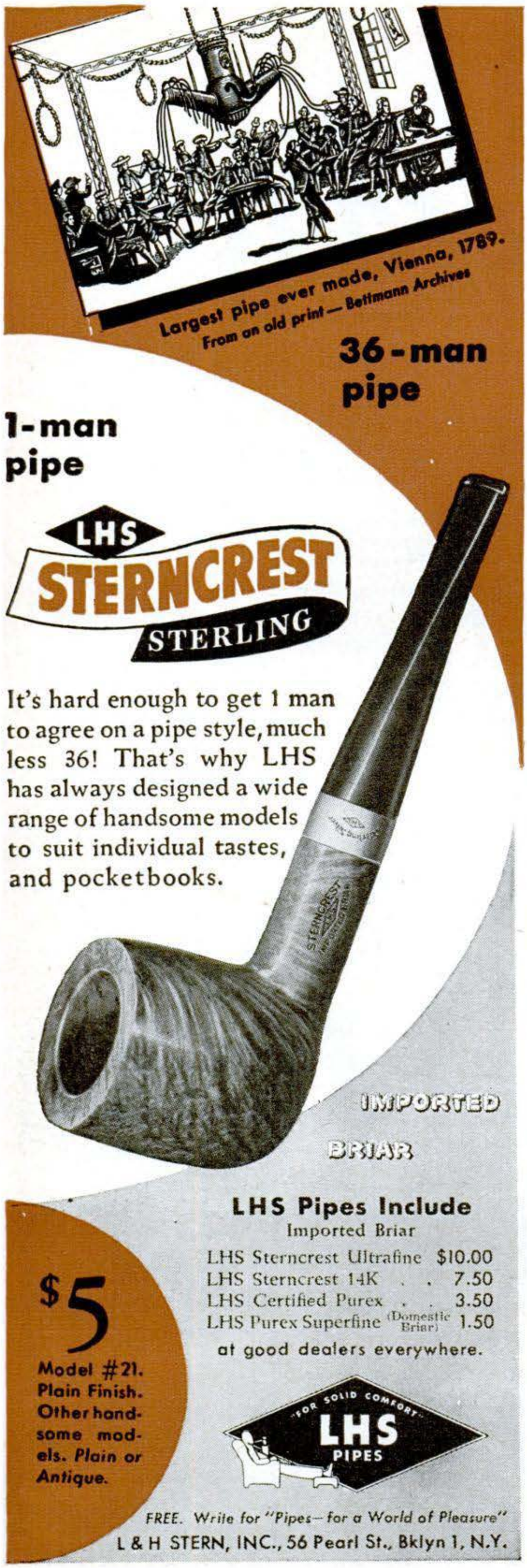
**(THOUSANDS SOLO IN 8 HOURS OR LESS)**

**OVER 1000 AERONCA QUALIFIED DEALERS to serve you.**

**AERONCA** *America's No. 1 Low Cost Plane*



Copyrighted material





# GRAVEST ILLNESSES are tasks for atomic research

that we are utterly helpless, or that atomic medicine holds out no hope. It does—but not tomorrow or the next day. How much time depends on whether we continue cancer research on what Dr. Shields Warren has aptly called a "shoestring scale," or pour real money, manpower, equipment, and effort into the job.

The atomic methods currently used in cancer therapy are: 1) External irradiation, in the form of regulated exposure to X rays, or other radiation from sources outside the body; or from a foreign body, such as a needle or capsule containing radioactive material, which is implanted in the tumor or placed in a body cavity; )2 Internal irradiation by administration of radioactive material that may be absorbed organically by cancerous tissue, which will thus receive radiation at the closest possible range. The first is by far the most important now; the other is still experimental.

Recent research has not contributed anything startling to external irradiation. We have new and largely untried forms of radiation, neutron streams in particular, but no proof yet that they behave radically different from X rays. *If* we could find a form of radiation that would damage all malignant tissue and spare all normal tissue, that would be the answer. Failing that, we must resort to what amounts to differential damage. Fortunately there is a tendency for malignant tissue to suffer more than healthy tissue under bombardment, and where this difference is appreciable radiation therapy is proportionately effective.

There is always the chance that among the various particles that we are learning to direct and control, something will be found that will give a significantly better differentiation. One way of accomplishing this would be by concentrating the energy of the radiation in depth through a sort of focusing action. Dr. G. Failla of the College of Physicians and Surgeons of Columbia University expects substantial improvement in the treatment of deeply located internal cancers with X rays generated by the high-energy electrons of the betatron.

The betatron is an electromagnetic device somewhat like the cyclotron, but it operates on A.C. instead of D.C., accelerates electrons instead of heavy positive particles, and works at much higher speeds. It is capable of generating X rays of voltages as high

(Continued on page 222)



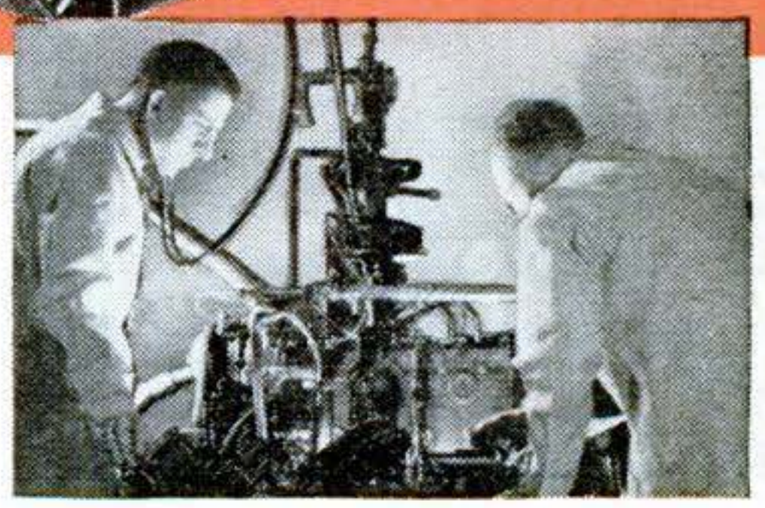
Copyrighted material

"Switch to Auto-Lite
. . . money cannot buy
a better spark plug"
*Dick Haymes*

"They put a song
in the heart
of your engine"
*Helen Forrest and Gordon Jenkins*

AUTO-LITE

*The Spark Plug that's Ignition Engineered*



**TREAT your engine to a new set of Auto-Lite Spark Plugs, ignition engineered for today's gasoline. If your spark plugs are faulty, you will restore gasoline mileage, get faster starts, smoother operation. And when so many of the nation's leading car manufacturers specify Auto-Lite Spark Plugs as original factory equipment, you can bet Dick Haymes is right . . . "Money cannot buy a better spark plug." So see your friendly Auto-Lite Spark Plug Dealer today.**

Auto-Lite Spark Plugs are ignition engineered. They're designed by men who have designed complete automotive electrical systems for 35 years!

AUTO-LITE MEANS PRECISION MANUFACTURING

**Toronto 1, Ontario • THE ELECTRIC AUTO-LITE COMPANY • Toledo 1, Ohio**

TUNE IN THE AUTO-LITE RADIO SHOW STARRING DICK HAYMES, SATURDAYS, 8:00 P.M.—E.S.T. ON CBS

*Switch to—*

# AUTO-LITE SPARK PLUGS

*"Ignition Engineered"*



Copyrighted material

# YOU CAN HAVE THE WORLD'S FINEST MECHANICAL TRAINING AND EARN WHILE YOU LEARN

If you are interested in machinery and want the knowledge and experience for a lifetime career in the field of mechanics, the U. S. Army has a twofold opportunity for you.

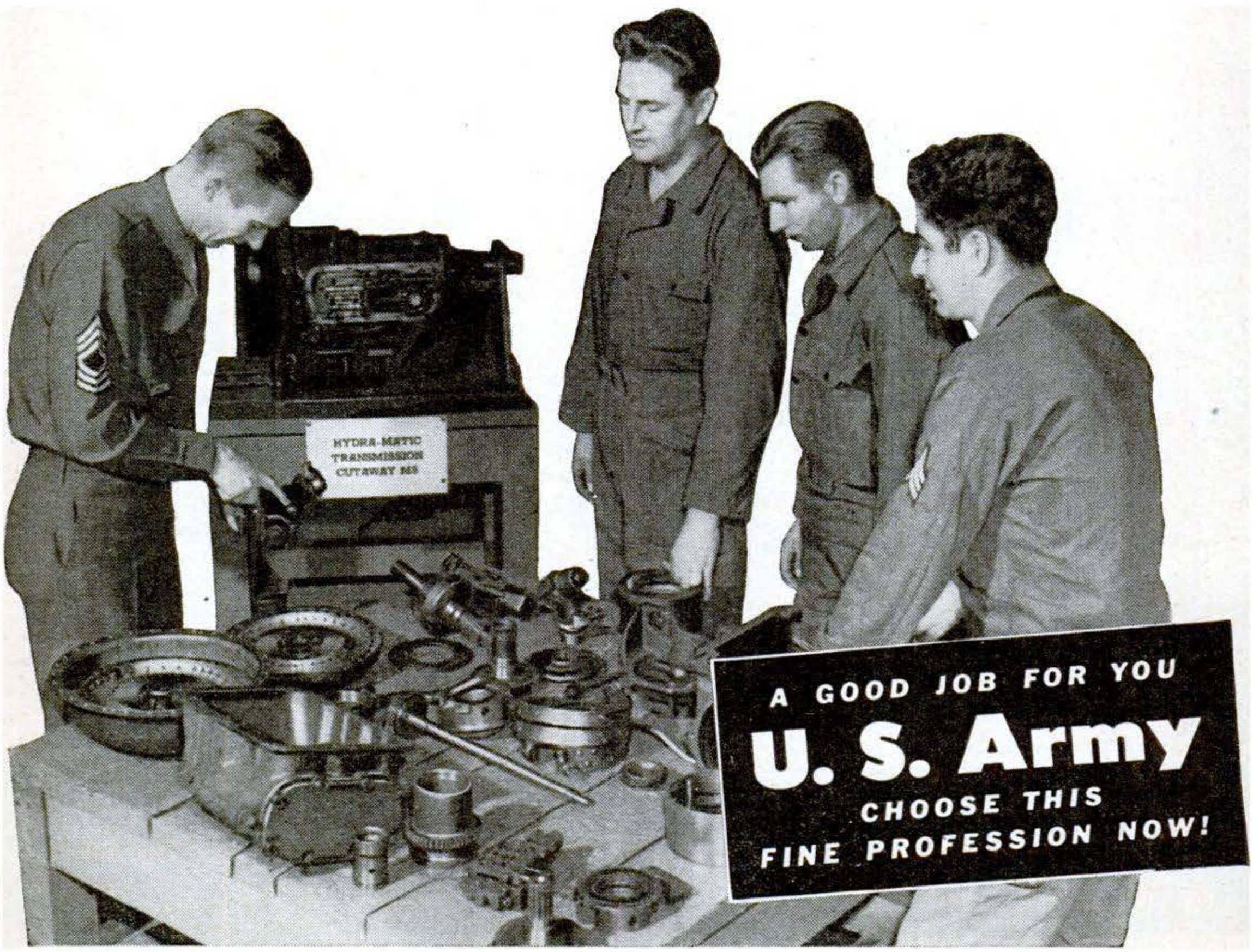
First, if you are 18 to 34 inclusive (17 with parents' consent) and will enlist now for a period of three years, you may choose to join one of the arms or services of the Army Ground Forces, Army Air Forces, or Army Service Forces, which will give you some of the best mechanical training in existence today.

You may attend one of the Army's top-flight mechanical schools, and master the technical details of all kinds of engines, including diesel, radial and internal combustion. You will be given practical experience in repairing and maintaining the Army's own fine equipment.

Second, under the GI Bill of Rights, after your discharge from the Army, you will be entitled to attend any college or trade or business school of your choice which will admit you, provided you enlist before October 6, 1946.

After a 3-year enlistment, you may have up to 48 months of education, with the Government paying your tuition and incidental expenses up to $500 per ordinary school year, and a living allowance of $65 a month ($90 a month if you have dependents).

Add to this good pay, travel, clothing, food, quarters, medical and dental care and a 30-day furlough each year, and you'll see that it's an opportunity you can't afford to miss. Get all the facts at your nearest U. S. Army Recruiting Station.






Copyrighted material

# for Power that Zooms in the spring..tra la!

● It's Spring again! And what a Spring—with gasoline galore and never-ending roads. With valleys and lakes, mountains and woodlands, all beckoning you to come on out and really live again.

It's what you've hoped for and dreamed about—and here it is, all yours!

But before you start out, you'll want Casite in your motor, whether it's old or new. Casite tunes up older motors—restores smoothness and power. And it protects new motors during the critical break-in period.

Casite carries oil quickly to the tight spots . . . retards formation of sludge and gum . . . reduces engine wear . . . keeps motors clean and full of zip!

Millions of motorists have used Casite . . . and keep coming back for more. Put a pint in the crankcase every oil change and a pint through the air intake every three months. It's sold by service stations, car dealers and garages.

THE CASITE CORPORATION
HASTINGS, MICHIGAN

**CASITE**

65¢ A Pint

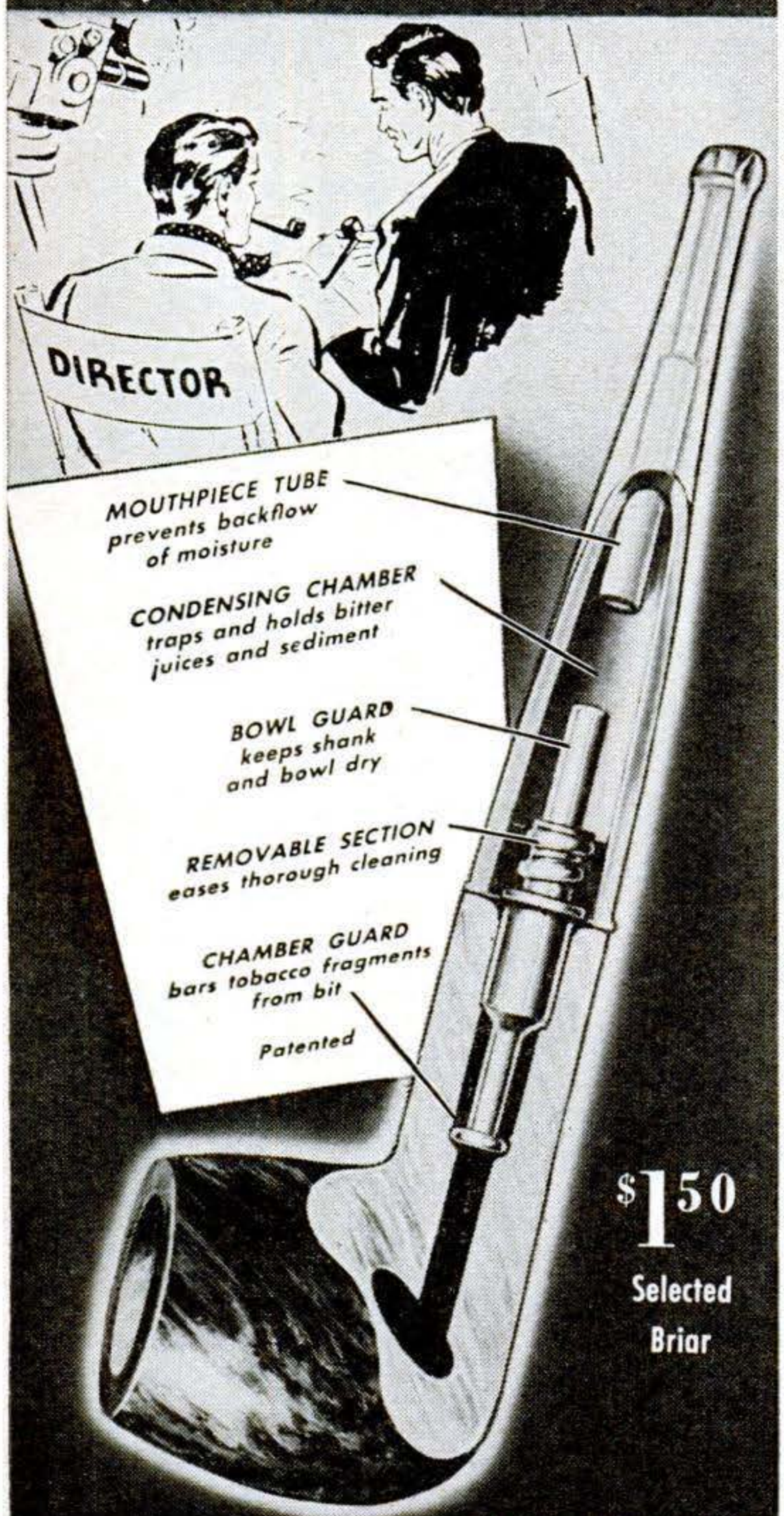
**BETTER AND SMOOTHER PERFORMANCE OR DOUBLE-YOUR-MONEY-BACK**

GUARANTEE—Add Casite to crankcase and run through air intake according to instructions, then drive your car 100 miles or for 60 days, whichever is first. If not convinced that Casite gives you better and smoother performance, you get double-your-money-back by filling out guarantee certificate and mailing it to The Casite Corporation, Hastings, Michigan. Maximum refund is $1.30 per pint, twice the nationally advertised price of Casite.



Copyrighted material

Royalton CROWN
For Men who Really Know Pipes




ROYALTON CROWN PROVIDES EXTRA SMOKING SATISFACTION because its condensing well and other safety features protect you from irritating juices and bitter slugs. Every bowlful smokes so clean, so cool, so ever-dry. Enjoy the full measure of pipe pleasure with a Royalton Crown.

HENRY LEONARD & THOMAS, INC., OZONE PARK 17, N.Y.

# GRAVEST ILLNESSES are tasks for atomic research

as 100,000,000. With conventional X rays at relatively low voltages the limiting factor is damage to the skin, while with betatron-generated radiation the skin in the entrance area should receive less energy than the skin in the area where the rays leave the body. In between, the energy would be at a maximum and could be concentrated on the tumor. Damage to normal tissues would still be a limiting factor, but a greater differential effect on the cancer cells in the interior of the body could be expected.

The second general method—internal irradiation—is also active at the moment. Radium salts were tried 40 years ago, but failed because they were not absorbed by the malignant tissue. If they had been absorbed, it would have been a case of going from the frying pan into the fire: the half-life of radium is 1,590 years, and there would have been no means of stopping irradiation at the proper point. But now we have the artificially produced radioactive isotopes. Their half-lives vary from a few seconds to several months or years, giving a wide range of periods of activity. Moreover, some of these isotopes are selectively absorbed—iodine by the thyroid gland, iron by the red blood cells, phosphorus by the bones, liver, leukemic cells, and various neoplastic tissues. The possibility thus raised is as obvious as it is attractive: let the cancer absorb the appropriate isotope and burn itself up. The real stuff, of course, would be something that neoplastic tissues would absorb avidly and to which normal tissues would be impervious.

Unfortunately, it is not enough that the radioactive substance should be absorbed three or four times as much; there must be a very high differential ratio if internal irradiation is to be highly effective. The only known isotope that fulfills this requirement is radio-iodine. This is absorbed by the thyroid, or by metastasizing thyroid tissue, about 300 times as much as by other tissue. Consequently it shows promise in the treatment of cancers of thyroid origin.[7]

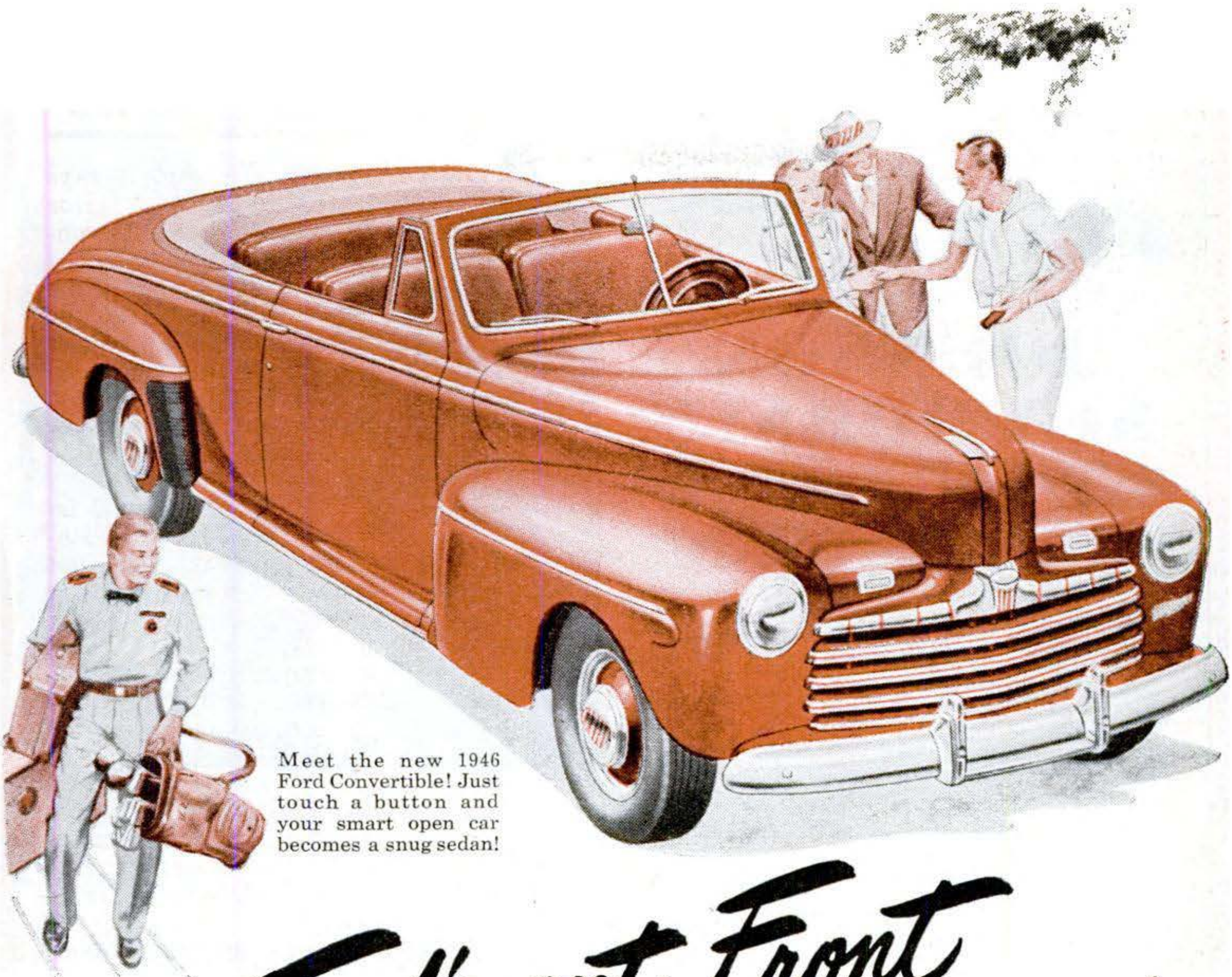
Actual progress has been slow. One reason is that radio-iodine, in particular, is extremely expensive. Ten thousand dollars was spent recently in treating one case; $4,000 in another. Yet there is plenty of radio-iodine in the country. It is being wasted up the stacks of the Manhattan Project now.

Drs. Andrew H. Dowdy and William F.

(Continued on page 226)



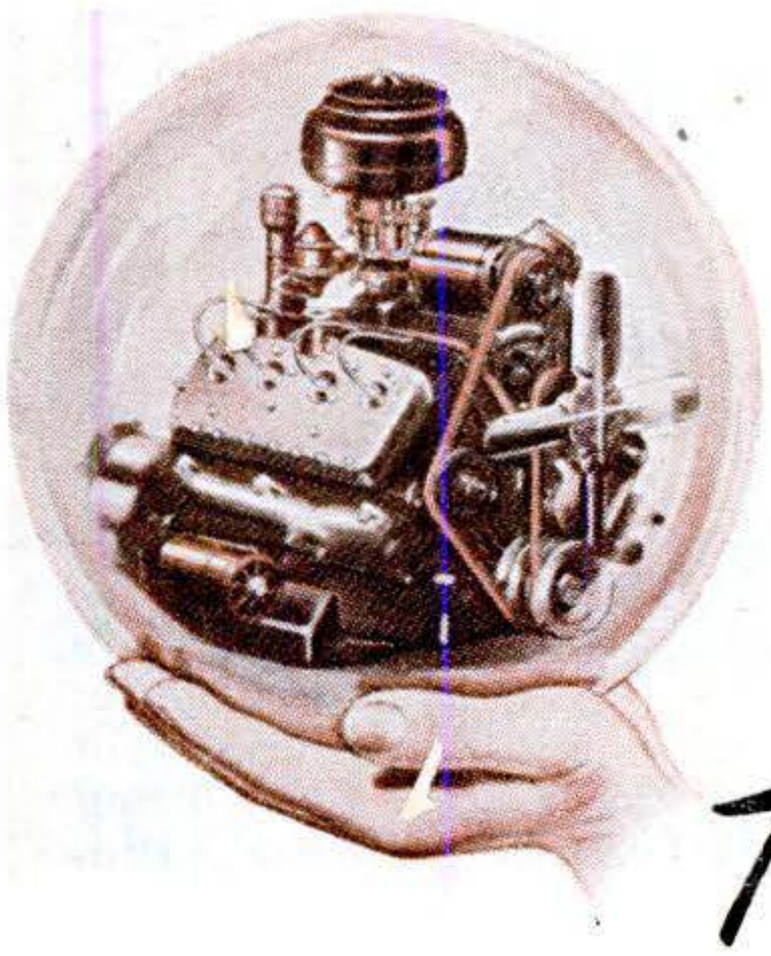
Copyrighted material



Meet the new 1946 Ford Convertible! Just touch a button and your smart open car becomes a snug sedan!

# Ford's out Front

## WITH THE BIG 100 h.p. V-8 ENGINE!



• No other car in its price class performs like the 1946 Ford because no other has the V-8 engine . . . no other has 100 horsepower! The V-8 type of engine, you know, is used in America's most expensive automobiles!

The new Ford V-8 is thrifty on gas and oil because of new 4-ring aluminum pistons and new balanced carburetion.

With this engine . . . with new oversized hydraulic brakes . . . with wider, lower, handsomer appearance . . . and with dozens of other improvements, no wonder so many people say: "Ford's out front in the low-priced field!"

## There's a Ford in your future

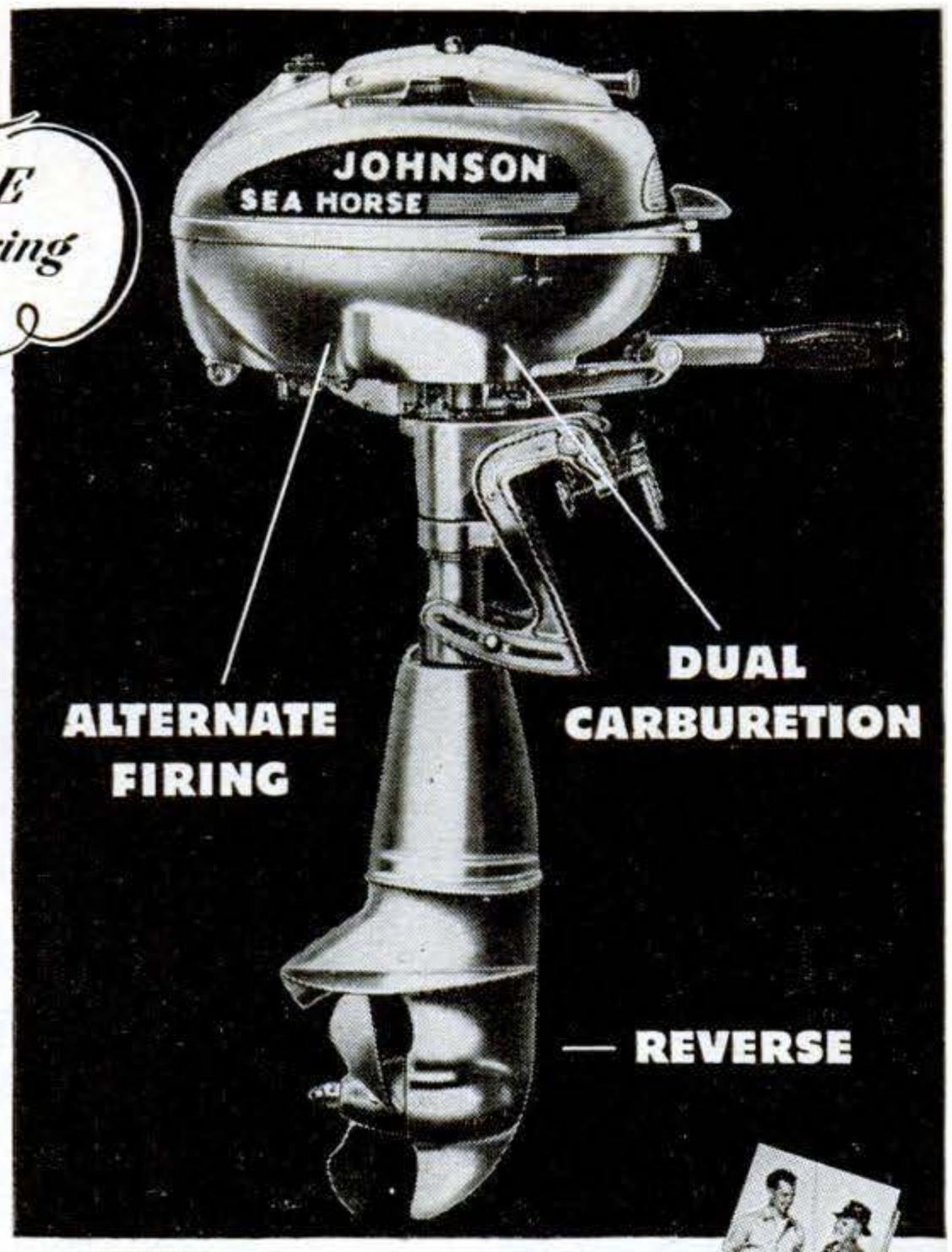
**TUNE IN . . .**

The FORD-Bob Crosby Show—CBS, Wednesdays, 9:30-10 P.M., E.S.T.
The FORD Sunday Evening Hour—ABC, Sundays, 8-9 P.M., E.S.T.



Copyrighted material

*The BIG THREE of Outboard Motoring*




# JOHNSON SEA-HORSES
## for DEPENDability

For utmost fun in outboard boating there are three "musts" to be considered in your motor. First, smoothness; second, reverse; third, full power at high speed with steady performance at trolling speed. You'll find all three in Johnson Sea-Horses.

Sea-Horses are strictly quality motors — built with dozens of refinements. And Johnson quality is backed by expert nation wide service — another Johnson "plus." See your Johnson dealer. Look for his name under Outboard Motors in your classified phone directory.

JOHNSON MOTORS, 500 Pershing Road, Waukegan, Ill.

**JOHNSON BUILDS SEA-HORSE MOTORS ONLY—NO OTHERS**

**FREE HANDY CHART.** Write for a copy of the new Sea-Horse Handy Chart which gives complete specifications on the 5 great Sea-Horses of the 1946 line.

**THERE IS NO SUBSTITUTE FOR EXPERIENCE**

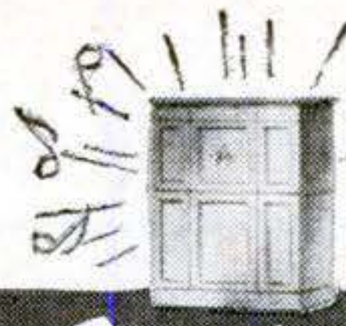
When you want to fix things fast . . . remember Weldwood Glue. It's quick to mix . . . easy to use . . . tremendously strong . . . stain-free . . . rot-proof . . . and permanent. At hardware stores, lumber yards, chain stores.

# WELDWOOD
**PLASTIC RESIN WATERPROOF GLUE**

UNITED STATES PLYWOOD CORPORATION, New York 18, N. Y.



Copyrighted material

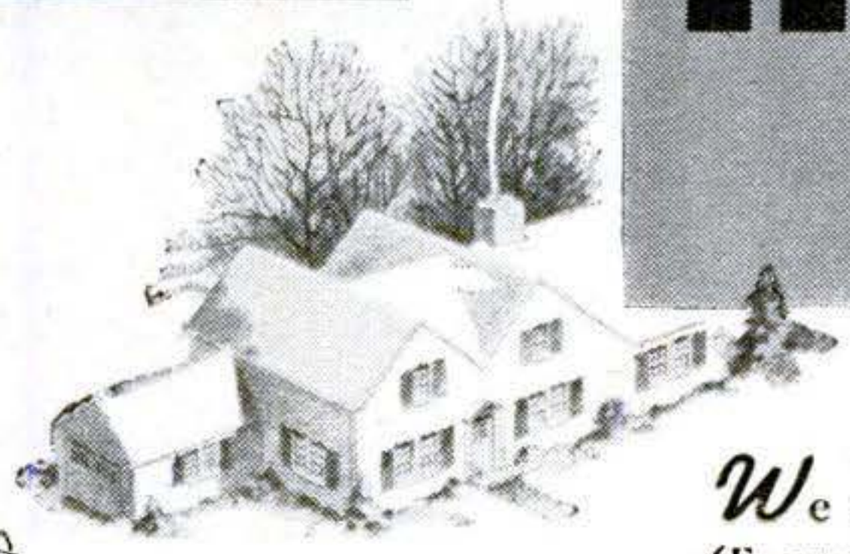


Coming!

**FM in RADIO**

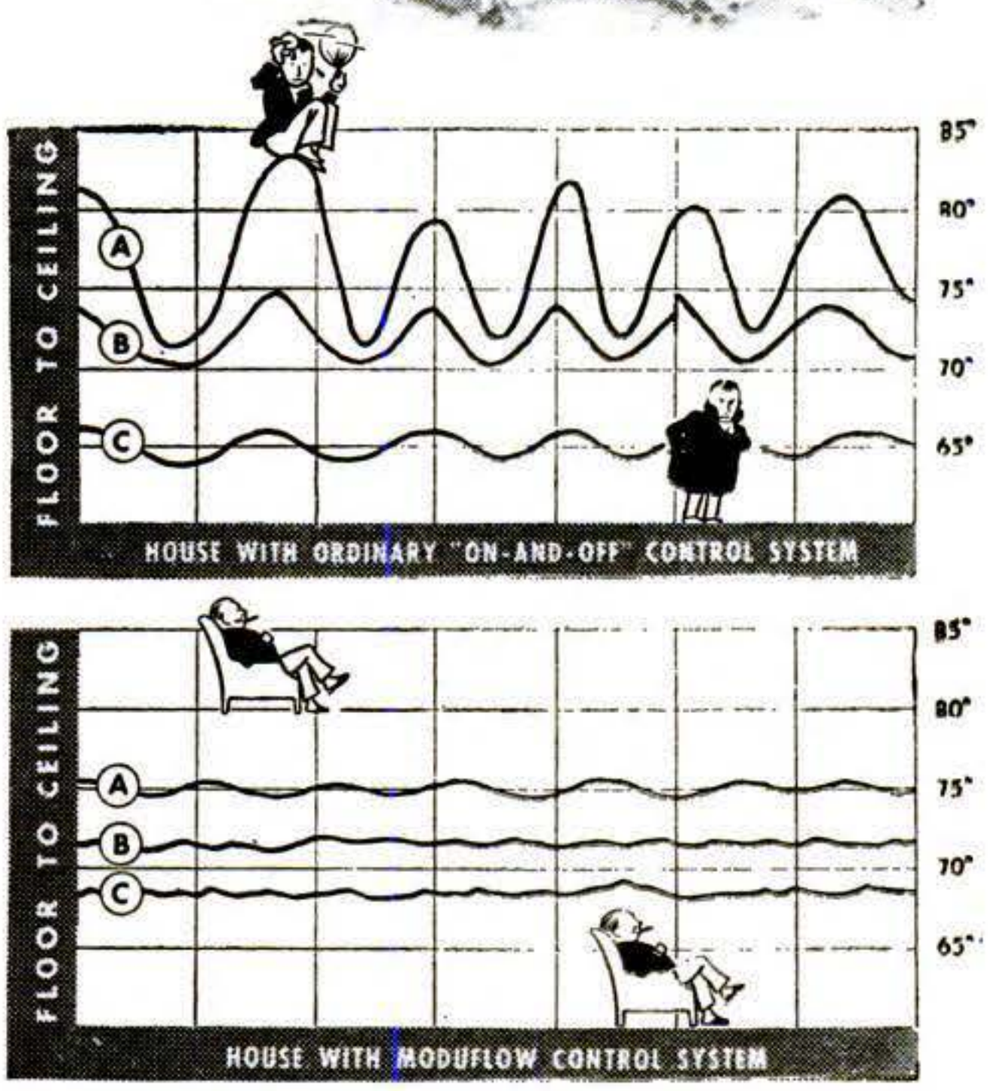
# Here!

# FM in HEATING



We are all expecting great things of F-M in radio (Frequency Modulation). In heating, F-M—"Full Modulation"— is already here, and is being installed in thousands of homes throughout the country. The Moduflow system, an exclusive Honeywell development, provides continuous flow of heat for every room in your house at the comfort temperature you and your family desire. Moduflow "Full Modulation" banishes temperature gaps, practically equalizing ceiling and floor temperatures. Much of the heat formerly wasted at the ceiling is used to heat the living part of the room; result, all-over comfort with improved efficiency in operation.

And unlike F-M in radio, Moduflow can be installed on your *present* automatic heating system. You don't have to wait until you build a new home. Send for the interesting booklet, "Heating and Air Conditioning the Postwar Home." It tells how Moduflow has created a new high standard of home heating comfort. Simply mail the coupon for your free copy.




A—Temperature at ceiling
B—at five foot level. C—temperature at floor.

**See how Moduflow** smooths out the up-and-down temperatures caused by ordinary control systems. Without Moduflow, temperature varies as much as 20 degrees from floor to ceiling. With Moduflow there is comfort temperature from ceiling to floor.

# MODUFLOW

**The New HONEYWELL Heating Control System**

**FREE!**

**MINNEAPOLIS-HONEYWELL REGULATOR CO.**
**2764 Fourth Avenue S., Minneapolis 8, Minn.**

*Please send my free copy of "Heating and Air Conditioning the Postwar Home."*

Name_____

Address_____

City_____ State_____

Tomorrow's Apartment will have Personalized Heat Control . . with Moduflow

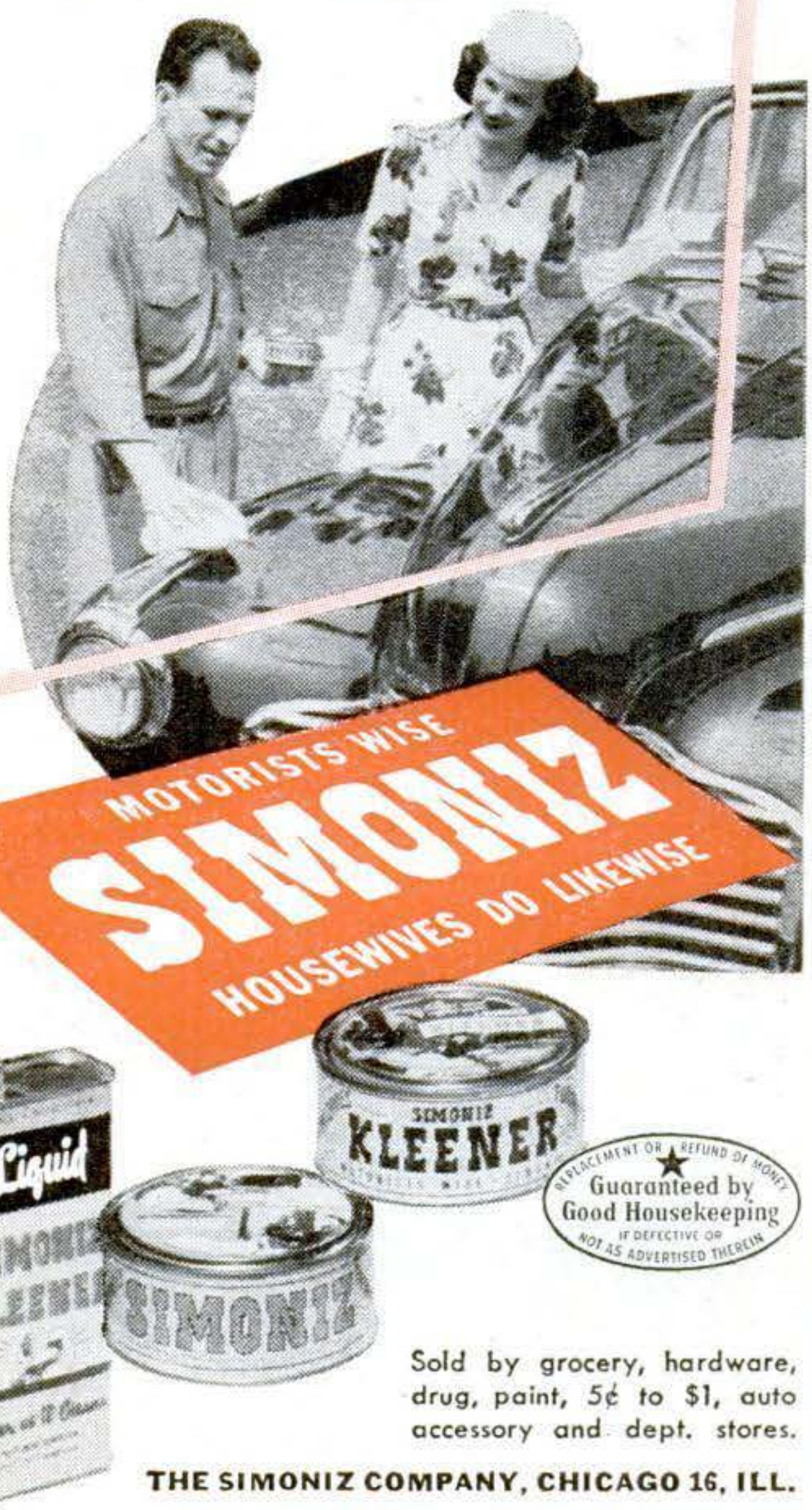


Copyrighted material

# Never a Dull Moment

**New Springtime Finish Beauty Needs SIMONIZ Protection, Too!**

Ready your car for Spring. Remove winter dullness from the finish—easily, quickly, safely—with Simoniz Kleener. Then Simoniz to "point up" this new beauty. It's positive protection against gritty mud, airborne chemicals, ultra violet rays—in fact, all causes of finish dullness. Flint-hard Simoniz saves car washings, too. A dry cloth wipes off dust and dirt . . . brings back mirror brightness. There's nothing finer than Simoniz . . . nothing better than Simoniz Kleener. Get them today.




Sold by grocery, hardware, drug, paint, 5¢ to $1, auto accessory and dept. stores.

**THE SIMONIZ COMPANY, CHICAGO 16, ILL.**

Recognized for over thirty years as authorities on preservation of fine finishes.


# GRAVEST ILLNESSES are tasks for atomic research

Bale of the University of Rochester, both experienced radiologists connected with the medical department of the Manhattan Project, have recently spoken hopefully of the long-term prospects in the field of atomic cancer therapy. They do not believe that radioactive isotopes in themselves are the answer. But they do suggest that by using isotopes like carbon and hydrogen ($C^{14}$ and $H^3$) it will be possible to investigate many compounds, existing and to be synthesized, in an effort to find one having a high degree of toxicity for malignant cells relative to normal cells. They think a combination chemical and radiation effect may work.

Advocating Federal sponsorship of nuclear research in cancer, Dowdy and Bale sum up in these words:

"The atomic age, for better or worse, is here to stay, and, with its attendant benefits to humanity in the solution of the cancer problem, it offers both an opportunity and a challenge to medical science, to the community and the nation."

That is good to hear. Hope, after all, has its biological justification as well as its dangers. And where there is hope, there should be life enough to meet the challenge.

[7]Dr. S. M. Seidlin and L. D. Marinelli give a brief preliminary report on one case in the Bulletin of the New York Academy of Medicine, August, 1945.

---

## New Glass Absorbs Most Heat Yet It Transmits More Light

A NEW heat-absorbing, color-transmitting glass that protects films and slides from damage or burning and shields movie and television actors from the intense heat of powerful spotlights and floodlights has been developed by the American Optical Company, of Southbridge, Mass.

In movie projectors, the new glass will be used as a screen to absorb the heat emitted by the light source. It absorbs approximately 90 percent of the infra-red, or heat, radiation, and transmits about 85 percent of the light, an unusually high transmission; usually about eight percent is lost by reflection.

The new product, of which phosphorus, aluminum, and silicon oxides are the principal ingredients, is chemically stable, and can be molded, ground and polished, and fabricated like ordinary glass.



Copyrighted material

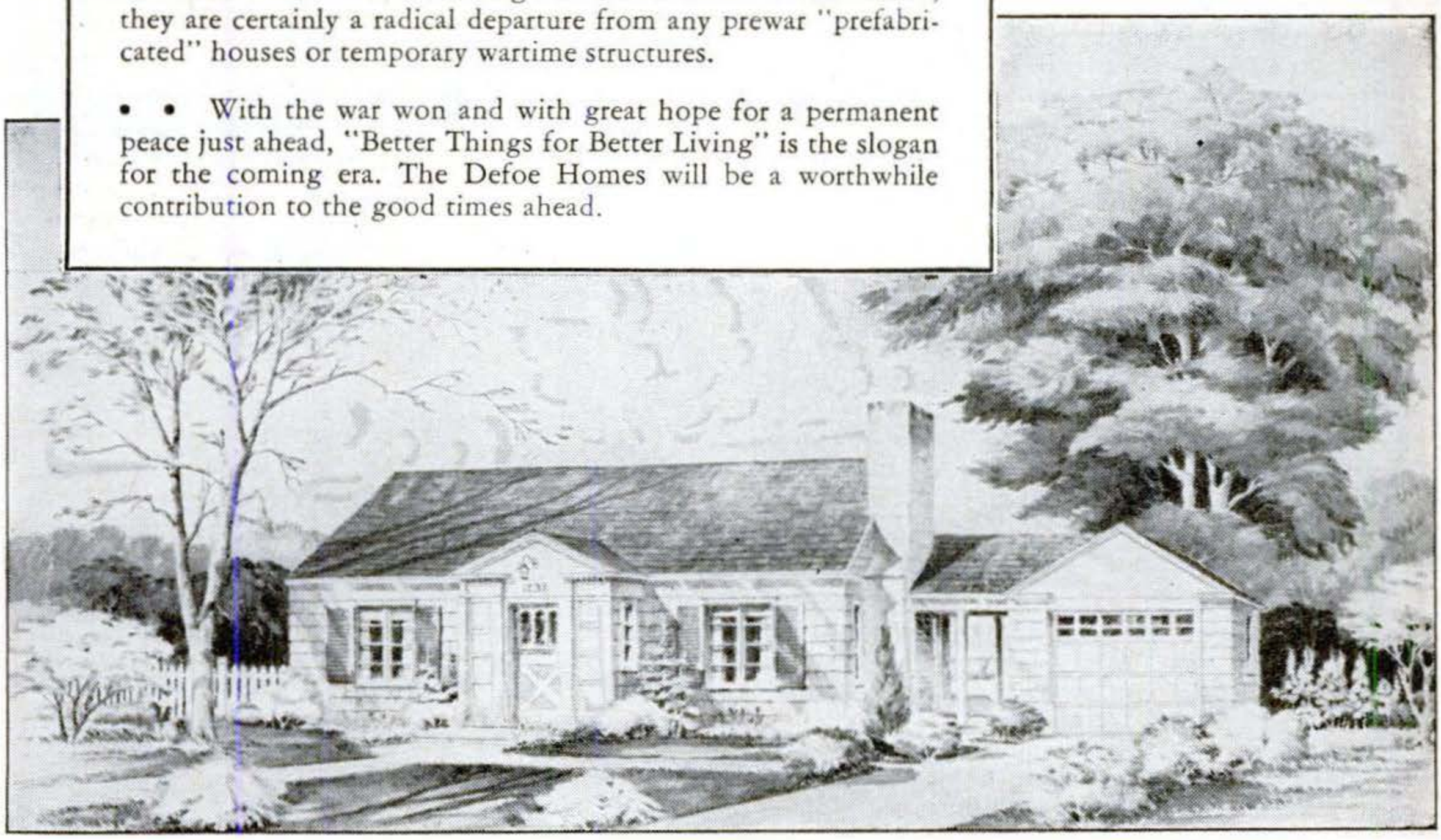
# DEFOE HOMES CAN ANSWER YOUR HOUSING PROBLEM

THE Housing Division of the Defoe Shipbuilding Company was developed with a two-fold purpose—to maintain, as closely as possible, the wartime employment level upon which the people of the industrial area in which the plant is located had come to depend and to offer the public a new solution to America's housing problem.

• • With this in mind, Defoe designers and engineers were called upon to create a new line of homes which would bring to their owners the comforts of functional design, the ease of maintenance made possible by modern compact construction—plus the economies of mass production methods. In addition, they must be built to outlast houses of standard construction!

• • The Defoe organization has delivered. The skill and experience acquired by more than forty years of fine workmanship and adherence to the age-old traditions of the shipbuilder's art have brought into being an entirely new concept of gracious living. The Defoe Homes reach new highs in comfort and convenience. While there is nothing fantastic or extreme about them, they are certainly a radical departure from any prewar "prefabricated" houses or temporary wartime structures.

• • With the war won and with great hope for a permanent peace just ahead, "Better Things for Better Living" is the slogan for the coming era. The Defoe Homes will be a worthwhile contribution to the good times ahead.



*This attractive Cape Cod home can be erected by the Defoe system. Variations in floor plan and exterior treatment can be made to satisfy individual requirements. This, like all Defoe Homes, can be purchased with or without the breezeway and garage.*

Defoe HOMES

HOUSING DIVISION
DEFOE SHIPBUILDING COMPANY, Dept. PS-5
BAY CITY, MICHIGAN

Please send me the descriptive brochure on the new Defoe Homes. Enclosed is 10c for handling and mailing costs.

*Name* _____

*Street* _____

*City and State* _____



Copyrighted material

# AMBITIOUS VETERANS PLAN FOR SUCCESS with *Atlas* TOOLS

"While in the Navy I had many occasions to use Atlas equipment and tools . . . laying plans for my own business . . . it is with pleasure that I write to a company that manufactures machines which I know are built to do the job and also take a lot of rough work."

— J.J.K., Upper Darby, Pa.

"I have been in ordnance work in the Air Corps for 21 months and have had many occasions to use an Atlas lathe. I was very impressed by its precision as well as its ease of operation. Since I want to start a shop of my own, I want to purchase some Atlas tools."

— Cpl. M.A.G., Bolling Field, D.C.

"I owned an Atlas lathe which I sold upon entry into the Army . . . While in the Army I used the Atlas shapers with which our mobile machine shops were equipped and am well pleased with the performance of both machines. We handled some jobs on the bench shaper which seemed almost impossible on such a small machine. I had built up a fair business of general machine work in my small shop at home, which included some gunsmithing. I now wish to continue that enterprise."

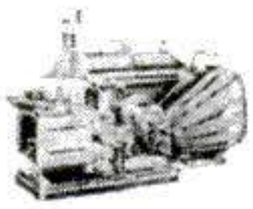
— W.W.M., Wheaton, Ill.

Resourceful, ambitious, enterprising — these veteran's letters reflect the spirit with which so many Atlas-equipped small businesses have gone ahead to great success. If you are interested in outfitting a commercial or home shop of your own, send for this free catalog.

**ATLAS PRESS CO.**
555 N. PITCHER ST.
KALAMAZOO 13D, MICH.

6"-10" Lathes

Milling Machines



Shapers

Drill Presses

# Mows and Trims Lawns

**In One Simple Easy Operation**

**8¼ Lbs.**

**Save Time and Labor with a**

## MONTAMOWER

New model. New type metal handle has special device to adjust cutting height. Drive shaft now mounted on free rolling, factory lubricated, and sealed ball bearings. No tired backs or aching arms. 8¼ lbs. of live precision made mechanism that first gathers, then cuts smoothly a clean 16" swath through grass, dandelions, spike grass and weeds. No noise or clatter. As modern and efficient as your electric razor. Cuts right up to walls, fences, trees or posts; leaves no fringes to be trimmed by hand. Cutters are self-sharpening. Built to last many years. Many thousands in use. Sold direct from factory. Costs little. Write at once for guarantee information and literature.

**MONTAMOWER DISTRIBUTING CO.**
**833 Keeler Bldg. GRAND RAPIDS 2, MICHIGAN**

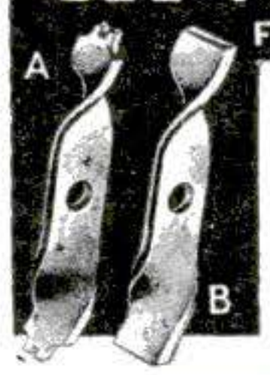
## FREE RADIO CATALOG

Latest radio and electronic parts and devices, newest ham gear, gadgets, war surplus items. All in this new FREE catalog. Don't delay,

**BURSTEIN-APPLEBEE CO.**
1014S McGee, Kansas City 6, Mo.

## USE YOUR BENCH SAW

**FOR JOINTING & CUTTING MOULDINGS**




With our six inch tool steel cutters make mouldings, casings, drop-leaf tables, grooves beading and jointing. Moulding cutters, A 1 in. wide $1.50, 1½ in. $1.75, Jointing cutters, B 1 in. $1.50, 1½ in. $1.75, E 1 in. for drop-leaf tables, $1.50, E 1½ in. Makes ¾ in. cove & Quarter. $1.75 Postpaid. Guaranteed. State size hole. List & Folder free.

**JOHN A. SANDSTROM**
**Rt. 1-P. Clearwater, Fla.**

## BUILD ARC WELDER PLANS 35¢

**We Show You How** to build this new powerful welder without rewinding. For light or heavy work. Uses coils taken from old auto generators. Works on 110 or 220 volts A. C. Has 20 different heats. Send 35c for complete PLANS and valuable Catalog. Write today.

**LEJAY MFG. CO., 1323 LeJay Bldg., Minneapolis 8, Minn.**

## *Show Mickey Mouse Cartoon Home Movies*

Films to thrill every Home Movie fan and projector owner. MICKEY always gives a stellar performance, whether alone or with Minnie and Pluto.

**Get These Mickey Mouse Features**

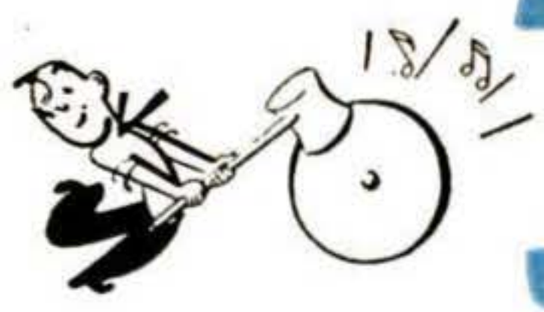
| | | | |
|---|---|---|---|
| 50 Ft. 8MM | $1.50 | 100 Ft. 16MM | $3.00 |
| Airplane Antics | 1516-A | Pluto's Shower Bath | 1521-A |
| Full Steam Ahead | 1518-A | Wild West Mickey | 1522-A |

See At Your Photo Dealers or Order Direct.
Catalog and Prices on Request. Write to:

**HOLLYWOOD FILM ENTERPRISES, INC.**
6060 Sunset Blvd. Dept. 116 Hollywood 28, Calif.

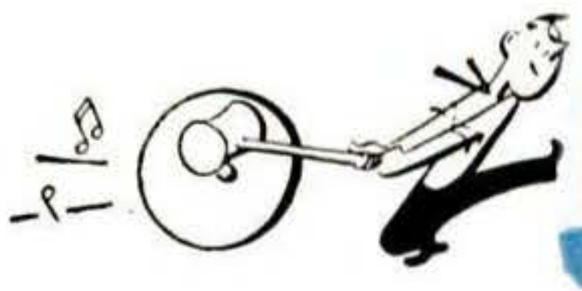


Copyrighted material



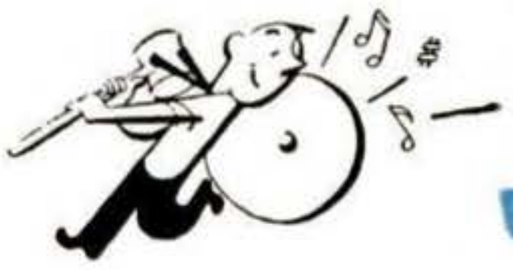
# look SHARP

**You look SHARP** because you get the best-looking shaves any man ever had!



# feel SHARP

**You feel SHARP** because Gillette Blue Blades give you the quickest, most refreshing shaves of your life!



# be SHARP

**You are SHARP** when you buy Gillette Blue Blades with the SHARPEST edges ever honed, because you get more shaves per blade and save money!

# use Gillette Blue Blades

*with the SHARPEST edges ever honed!*

**GILLETTE'S CAVALCADE OF SPORTS** presents the major boxing event of the week every Friday night over American Broadcasting Company stations at 10 o'clock E.D.T.

**Gillette Safety Razor Company, Boston 6, Mass.**

Copyright, 1946, by Gillette Safety Razor Company.



Copyrighted material

use

# K&W RADIATOR SEAL *First!*

Want fast, positive repair for that leaky radiator? It's easy with K & W Radiator Seal — guaranteed to restore leaking radiators to unimpaired service in just 30 minutes!

Don't waste time and money trying one seal after another. Use K & W first—because, if one bottle of K & W does not seal every leak in a 24-quart radiator in 30 minutes, no seal, but only a *competent radiator repair shop can make that repair!*

K & W Radiator Seal is efficient, economical, easy to use. Merely pour in radiator—hoses or thermostat need not be detached. K & W will not clog or flush out, leaves nothing in suspension, needs no "extra charge" service labor.

K & W Radiator Seal is part of the famous K & W family of *"Guaranteed Products For Better Car Service."* Ask for these outstanding products at your service shop today!

**AND . . . FOR IMMEDIATE, INVISIBLE, REPAIRS TO CRACKED BLOCKS AND HEADS**

● K & W Metallic Seal and Mechanical Method—two war-proved, *absolutely* guaranteed methods for restoring cracked engines to unimpaired service. Used chiefly by leading engine rebuilders, fleet operators, railroads and military repair centers, these amazing time and money saving K & W services are *now available to car owners* at better service shops everywhere.

**K&W METALLIC SEAL AND MECHANICAL METHOD**
**REPAIRS ARE GUARANTEED FOR THE LIFE OF THE ENGINE**

If you cannot locate a K & W Service Shop in your community wire or write Kerkling & Company, Bloomington, Indiana for names of those nearest you.

# MAKE MONEY

*Selling*

**FLUORESCENT**

**SAVES**

**1/2**

**on Electric Light Bills**

**Just Plug in and Light**

**NO MORE extra equipment. No more special wiring.**

# *Screws*

**INTO SOCKET JUST LIKE BULB!**

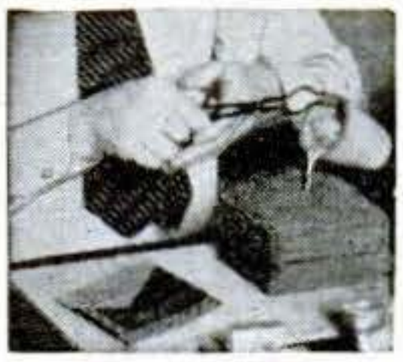
**SALESMEN!** Once expensive—once costly to install—out of the reach of most people, Fluorescent Lights still sold in millions. Experts now predict war starved market of 3½ BILLION, and with invention of fixture that screws in like an ordinary light bulb, a fixture that can be installed in an instant, a fixture that sells complete with tubes at a new low price—the most spectacular sales opportunity of the decade has been opened up for salesmen and distributors. Enormous advance commissions. Exceptional factory co-operation includes financing big orders by shipping open account to your customers.

**FREE** If earnings of $5,000, $10,000 and $15,000 a year don't scare you, rush your name by fastest way for sensational facts—sales plans—complete line with pictures and prices. This is the hottest item in direct selling today. Even if you don't answer another ad in this magazine, rush your name on this proposition—right now.

**North American Mfg. Co., 5042 Cottage Grove, Dept. 45, Chicago 15, Ill.**

**Sand Casting—Forging—Heat Treating—Case Hardening**

# BRONZE FOUNDRY



is again available in limited quantity without priority. Orders filled in sequence as received. INVENTORS-SCHOOLS-CRAFTSMEN use FOUNDRYETTE for making castings quickly for new inventions, for instruction, and general purpose. Order now for early delivery. Three sizes are available capable of making bronze castings of 1½, 3, and 6 pounds weight, aluminum, copper, brass, etc. $17.50, $24.00, $34.50, f.o.b. Kansas City. Domestic gas supply and 110 volt AC or DC energy required for operation. Write for circular.

**KANSAS CITY SPECIALTIES CO.**
**Box 6022, Dept. S-66 Kansas City, Mo.**

# STOP THAT DRIP

**EFFECTIVE IMMEDIATELY**

New—for homes! A *sure cure* for condensation drip from cold water pipes. Pliable, cork-filled NoDrip Tape eliminates wet floors, makes idle space usable!

***Quick, Clean, Easy to Wrap on***—No tools needed. Covers joints as well as straight pipes.

At hardware, dept. stores, lumberyards.

Roll, enough for 7 feet of ½" pipe **$1.25**

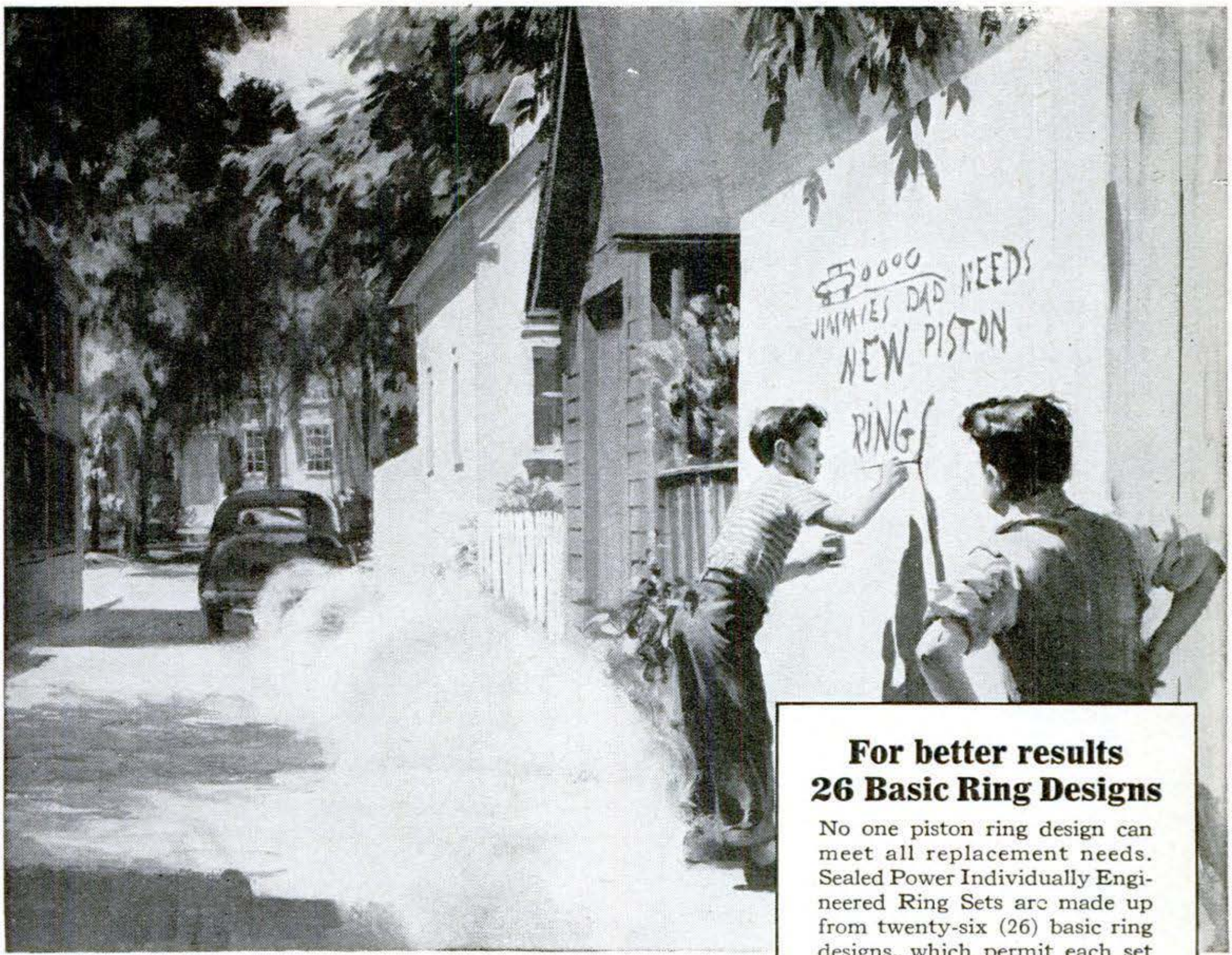
*Higher west of Rockies & Canada*

Write for NoDrip Tape circular

**J. W. MORTELL CO.** 534 Burch St. KANKAKEE, ILL.



Copyrighted material




## For better results 26 Basic Ring Designs

No one piston ring design can meet all replacement needs. Sealed Power Individually Engineered Ring Sets are made up from twenty-six (26) basic ring designs, which permit each set to be specifically engineered to do the best possible job in a particular make of engine.

These ring sets are engineered to save gas without sacrifice of oil economy, to save oil without inducing friction and cylinder wear. Each set gives balanced performance in a particular engine.

# *Piston rings cost less than smoke rings...*

EVEN youngsters today know hot smoke from a car means burning oil, wasted power, cumulative damage to cylinder walls. All these can be cured by reconditioning the engine and installing new Sealed Power Piston Rings. They lengthen engine life, restore original power, save oil, save gas.

Whatever the make, model, or degree of cylinder wear in your engine, there's a Sealed Power Ring Set specifically engineered to do the best possible job. Sealed Power people are proud of their product and its 35-year record of preference by leading car, truck and engine builders. See your Sealed Power franchise dealer and ask him for the new booklet, "What Causes Excessive Oil Consumption." Or write direct to Sealed Power Corporation, Muskegon, Michigan and Stratford, Ontario.

***Piston Rings***
***Pistons***
***Cylinder Sleeves***
***Valves***
***Water Pumps***
***Chassis Parts***

**KEEP YOUR WAR BONDS! GET $4 FOR $3!**

© 1946, Sealed Power Corp.

# SEALED POWER PISTON RINGS

**BEST IN NEW CARS! ★ BEST IN OLD CARS!**



Copyrighted material

NEXT TIME SAY

# BRIGHT STAR

and you will get a

FLASHLIGHT & BATTERIES

famous since 1909

for QUALITY,

STYLE and

SERVICE

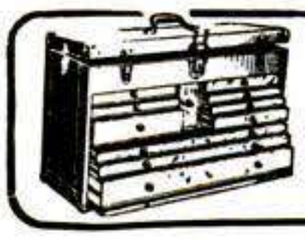
BRIGHT STAR BATTERY CO. CLIFTON N. J.

# PENSACOLA FLORIDA

## *Offers Opportunities For Small Businesses*

This pleasant, friendly, rapidly growing industrial city provides plenty of chances for ambitious men to establish successful small businesses with little capital. Why not live and work and succeed in sunny Florida? If you want to strike out on your own, write today for information.

INDUSTRIAL DEVELOPMENT DIVISION . . .
MUNICIPAL ADVERTISING BOARD
PENSACOLA Florida



## *GERSTNER Tool Chests*

Skilled mechanics have made **Gerstner** Chests for 40 years. Preferred by Tool, Die and Pattern Makers. Free Catalog.

**GERSTNER TOOL CHESTS**
**546 Columbia St., Dayton 7, Ohio.**

# NO SLIPS ON MOTOR TRIPS

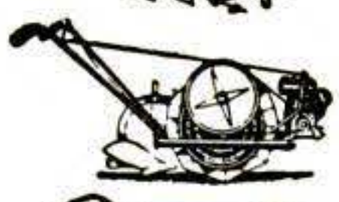
It's easy to miss directions on strange highways or city streets—unless you drive with a **HULL STREAMLINE AUTOMOBILE COMPASS.** Accepted guide of motorists. Saves miles of travel and valuable time. Circular free. **At** your dealer's. **Price $3.95.**

**HULL MFG. CO.**
**P.O. Box 246-E6** **Warren, Ohio**

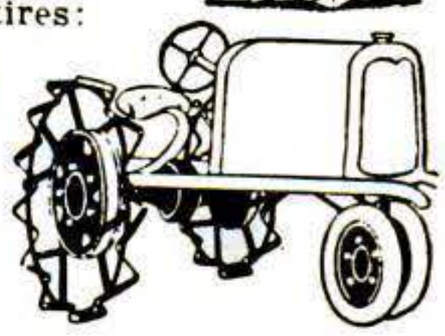
# SHAW "DU-ALL" and "Peppy-Pal" GARDEN TRACTORS

● 1 to 9 H.P. Circulars on request. Building more now—We supply repairs for all SHAW Tractors sold in our 42 years in business.

## BUILD YOUR OWN RIDING TRACTOR—"WAR HORSE"



using old auto parts, powered by 2 H.P. or larger air-cooled engine; or walking type Garden Tractor ½ to 3 H.P. or convert truck or auto into Farm Tractor. Each with steel or rubber tires: will plow, cultivate. Plans for building, in few hours, any one of above, postpaid for $1.00 (state which wanted) or all 3 for $2.00. Money Back Guarantee!

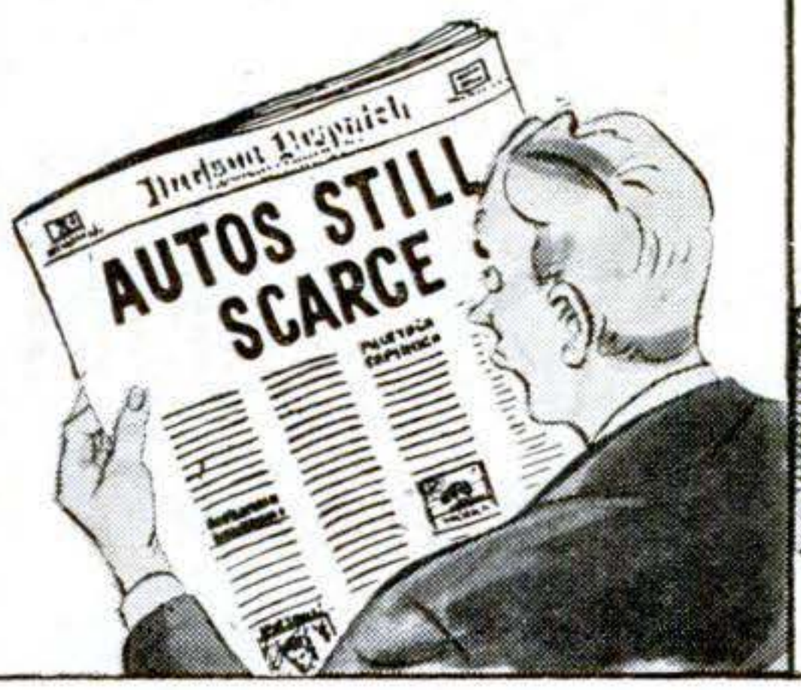


**SHAW MFG. CO., 5705 FRONT ST.**
**Galesburg, Kansas**
**668PS North 4th St., Columbus, Ohio**




Copyrighted material

CAN'T GET A **NEW** CAR?




DON'T WORRY OR **FUSS**

**Here's the easiest-working, speediest polish ever**

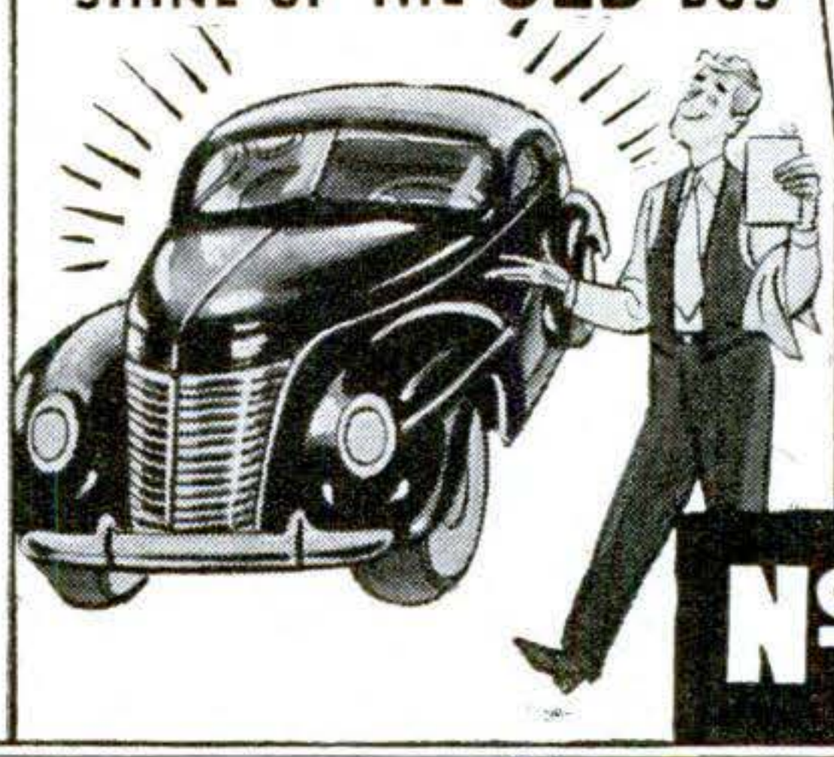
Just once over cleans away traffic film and grime, makes your car sparkling bright. For the shine of your life, try a can of Du Pont No. 7 Polish.

DU PONT

Better Things for Better Living
. . . Through Chemistry

GET THIS **EASY** POLISH

SHINE UP THE **OLD** BUS



**Nº 7 POLISH**

**Makes OLD DRILLS AS GOOD AS NEW**

Saves Time and Money. Anyone can do expert drill grinding with this simple-to-use drill grinding attachment. Fits on any bench grinder. Does not heat or burn drills so they lose their temper and crystallize.

PAYS FOR ITSELF QUICKLY

**SENT ON TRIAL** Get this amazing Rite-Way Sharpener on trial, test its superior merits. Write for FREE literature today.

**T & H Mfg. Co., 811-E, East 31st, Kansas City 3, Mo.**

AT LAST **SPEE-DOWL**

A PRACTICAL HOME WORKSHOP DOWELMAKER

Just what you have always wanted. Makes perfect, burnished dowels on your lathe or drill press. Available now in 2, 3, 4, 5, 6, 7, and 8 1/16th sizes. SEND check or Money Order for $1 each, any four sizes $3 or complete set of seven $5 postpaid. No C.O.D.

SPEE-DOWL 34 MALI NORTH PLAINFIELD, N.J.

**Red Star**

**A First Rate Fire Fighter**

Drenches flame under chemical pressure. Easy to use—just invert. Strong stream shoots 40 feet. No moving parts. Exclusive Sure Sweat Seam construction. Underwriters' approved for fires in wood, rubbish, paper, textiles. Write for descriptive folder. The General Detroit Corp., 2270 E. Jefferson, Detroit 7.

**DEAF PEOPLE**

**WINTER AND SUMMER WEAR COMFORTABLY**

**PARAVOX**

ONE CASE - ONE CORD
HEARING AID

The last word in hearing-aid comfort and efficiency. All elements in one small, stylish case with one cord and ear-receiver. Handy as a compact or cigarette case — superb hearing efficiency.

**NO SEPARATE BULKY BATTERY CARRIER**

Comfortable in summer or winter. No extra wires — no extra battery case. Parts designed with watchmaker precision. Clear amplification, wide range in tone. Guaranteed for one year against material defect — Priced right.

*Try a Paravox— you be the judge.*

**SERVICE PROBLEM SOLVED**

No sending set to factory for service — no bothersome loan sets.

*Accepted by the Council on Physical Medicine, American Medical Association*

FREE

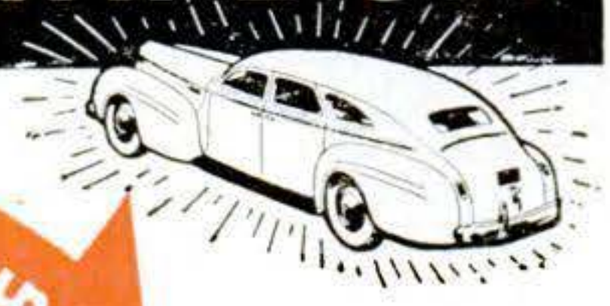
Get this booklet "New Satisfactions from Hearing Aids"

**PARAPHONE HEARING AID, INC.**
2042 East 4th St. Cleveland 15, Ohio




Copyrighted material

# RUB ON
*Let dry a minute*
# WIPE OFF



*Clean 'em up Shine 'em up*

*The Quick* **ZECOL** *Way*

ZECOL's popularity with car owners is due to its Quality, its Quickness and Ease of Application.

Keep your car looking shiny and new. It's so easy with ZECOL. Adds a brilliant lustre to all types and colors of lacquers and enamels.

If your car has an accumulated road film, use ZECOL Scum Remover before applying ZECOL Wax.

***Ask for ZECOL*—at service stations and garages. Pints 75c, quarts $1.25, in USA.**

## ZECOL Cooling System Conditioner

Recommended to remove and prevent rust. Easy to use. No draining or flushing. Add to radiator—clean up rusty water while you drive. Lubricates water pump, bearings and seals. At service stations and garages.

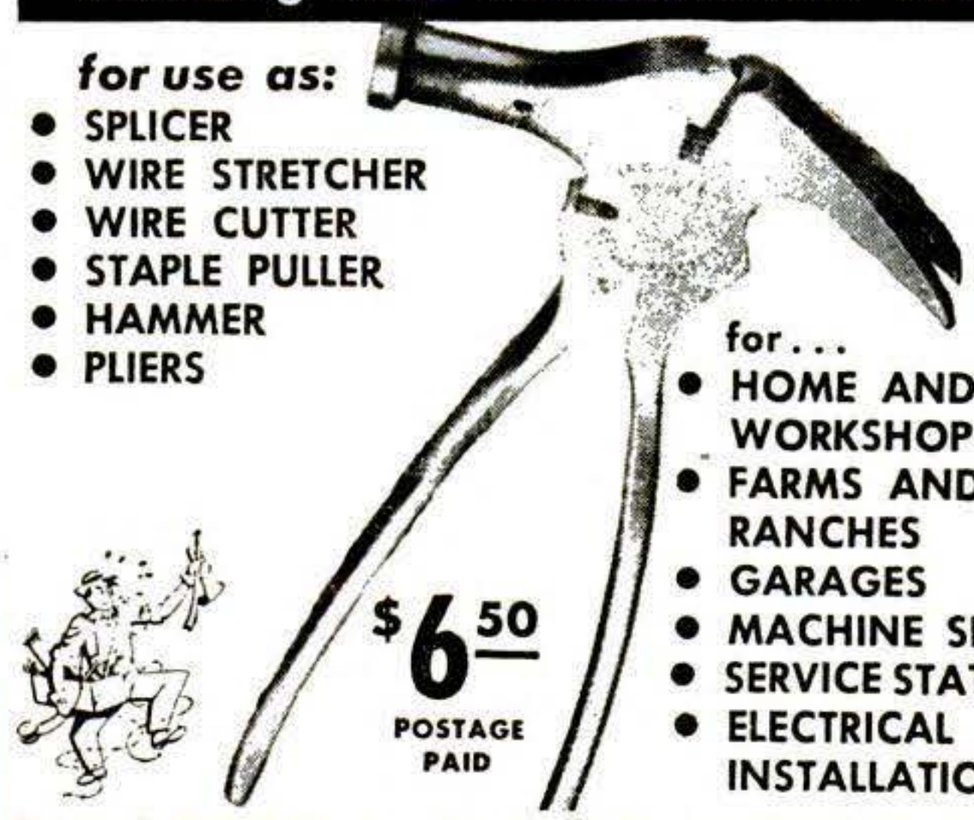
**ZECOL INC.**
**Dept. 2, Milwaukee 1, Wis.**

## *CAR OWNERS . . .*

For smooth engine performance —pep and power—for stepped up lubrication—to free sticky valves —keep rings and valves free—ask for LUBAID. At service stations and garages. LUBAID Co., Dept. 2, Milwaukee 1, Wis.

# FIX IT FAST with FENCE-MASTER
***Amazing New COMBINATION TOOL —***

***for use as:***
- SPLICER
- WIRE STRETCHER
- WIRE CUTTER
- STAPLE PULLER
- HAMMER
- PLIERS



**$6.50**
POSTAGE PAID

**for . . .**
- HOME AND WORKSHOP
- FARMS AND RANCHES
- GARAGES
- MACHINE SHOPS
- SERVICE STATIONS
- ELECTRICAL INSTALLATION

## *REPLACES A WHOLE KIT OF TOOLS*

A combination tool that displaces a whole work-kit and has a thousand-and-one different uses. Splice a fence, mend a clothes-line, stake up a tree and FENCE-MASTER fixes it right . . . simply and easily.

It's so light you can carry it anywhere (1 ½ lbs.) — in tool box, pocket, saddle-bag or car compartment . . . an all-purpose tool ready to handle almost any emergency.

Overall length: 10¼", rust-proof finish of heat treated, drop forged chrome-molybdenum steel.

Sent to you postage paid for only $6.50.

**PLASTIC MOLDED PRODUCTS, INC.**
*(Metals Division)*
1235 West Sixth Street, Dept. PS-5, Los Angeles 14, California

**WRITE For FREE Literature**

THE RITE-WAY MOWER ATTACHMENT

## BUILD YOUR OWN POWER LAWN MOWER

**WHY BREAK YOUR BACK MOWING FIELD OR LAWN?**

Now anyone can save time and effort mowing field or lawn, by building their own whirl type power mower.

We furnish complete information, and whirl type blade attachment. Write today.

**T & H Mfg. Co.**
811 E. 31, Dept. E.S.2, Kans. City 3, Mo.

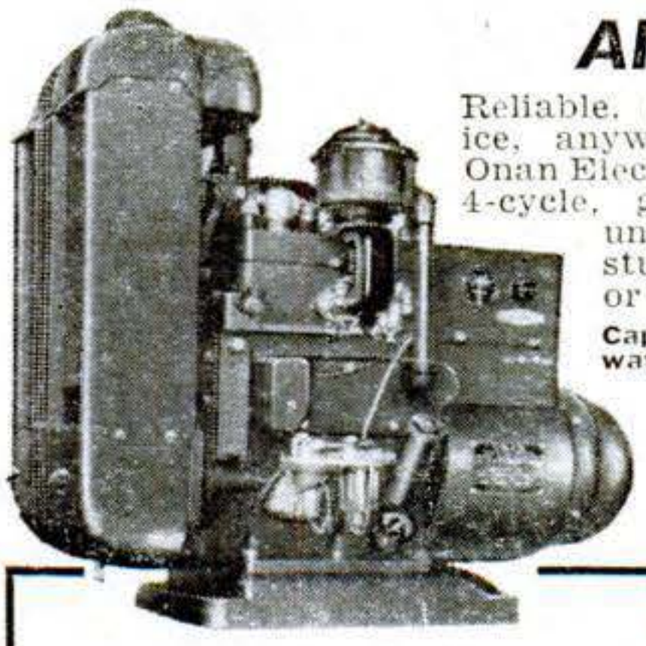
## Arc Welded Design "Know-How"

Only $3.50 each
3 different volumes
$10.00 postpaid

Each volume contains over 100 welding designs. Write

Hobart Bros. Co. Box P-561, Troy, O.

# ELECTRICITY FOR ANY JOB
## *ANYWHERE*



Reliable, economical electric service, anywhere, anytime, with an Onan Electric Plant. Driven by Onan 4-cycle, gasoline engines. Single-unit, compact design and sturdy construction. Water or air cooled.

**Capacity range 350 to 35,000 watts. 115 to 660 volts A.C. 50 to 800 cycles 6 to 800 volts D.C. Combination A.C.-D.C. types**

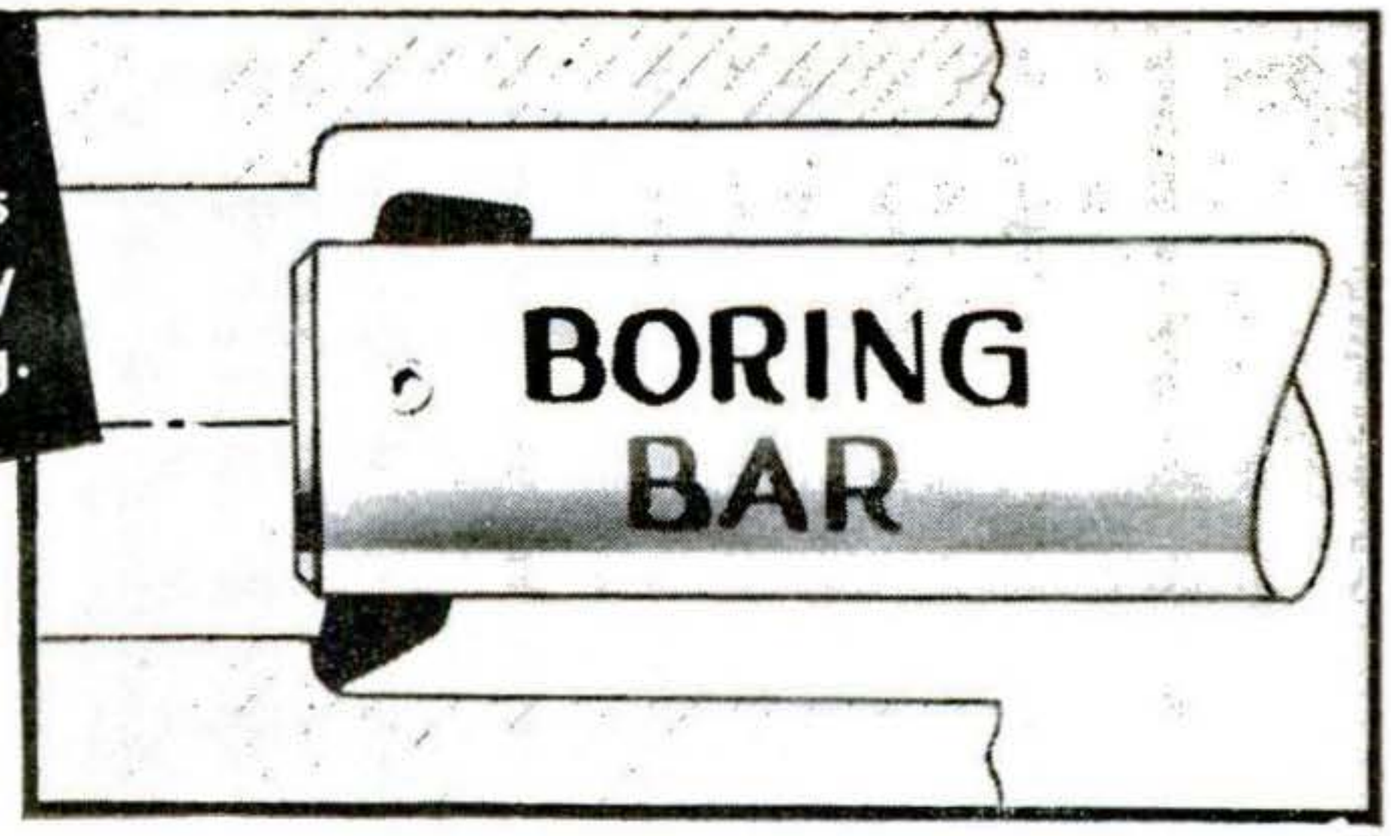
65 different models.
Write for folder.

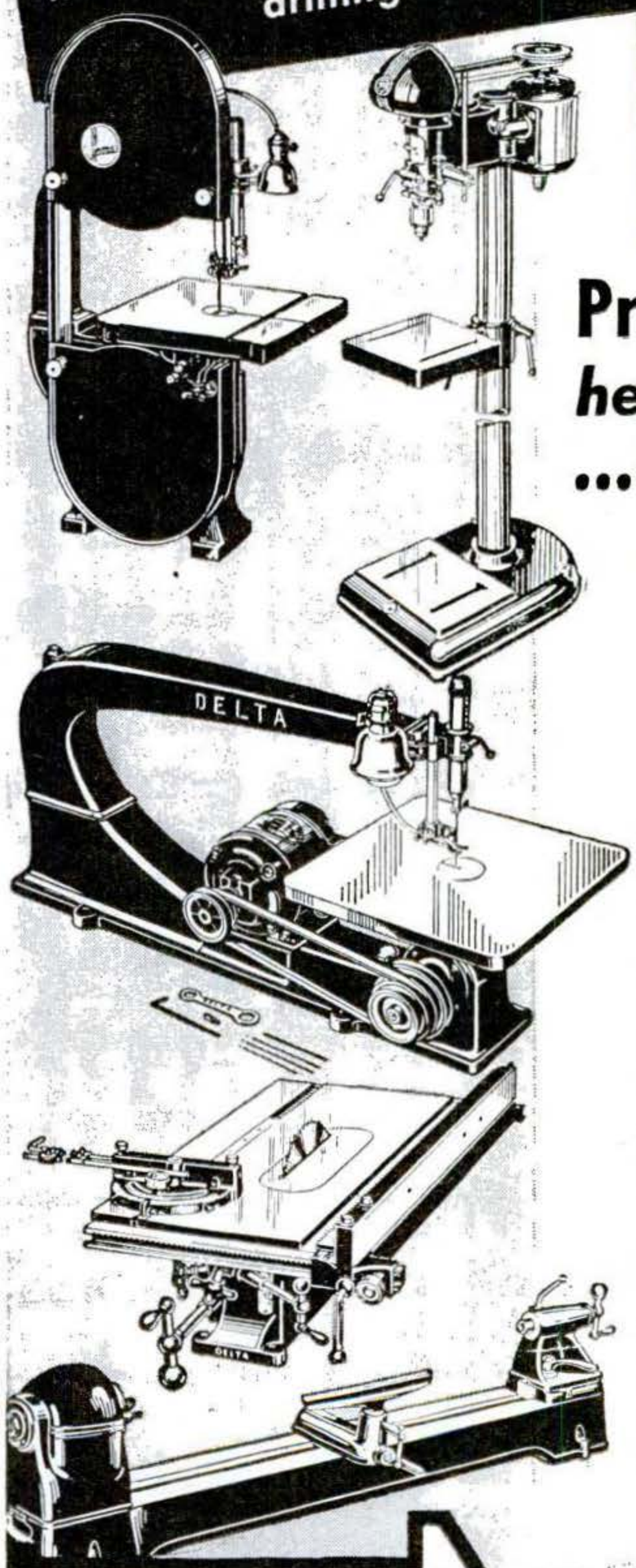
**ONAN**
D. W. ONAN & SONS 1839 ROYALSTON AVE. MINNEAPOLIS 5, MINNESOTA




Copyrighted material

Rigid boring bar cuts bearing seat accurately. The cut is light, maintaining closer tolerances than are possible with ordinary drilling or reaming.




# Precision-bored Bearing Seats

## *help you enjoy greater accuracy ...smoother operation—with your*

**DELTA**
**MILWAUKEE**
REG. U. S. PAT. OFF.

POWER TOOLS

### Other advanced engineering features include:

**Lubricated-for-life Ball Bearings.** You don't have to worry about oiling these bearings. They're *lubricated for life* when they leave the factory. And they are *double-sealed* against harmful dust.

**Pre-loaded Bearings.** This is the result of an extra manufacturing operation that reduces the "play" in the bearings to help you enjoy long-time operating efficiency and accuracy.

**Precision-ground Shafts.** These are shafts built to run without any "wobbling" which may throw off measurements.

**Dynamically-balanced Pulleys.** The pulleys which transmit the power from your motor to your power tool are balanced to help eliminate annoying, damaging vibration.

The accuracy and precision *built into* Delta tools largely replace the manual skill of the old-time hand craftsman. Once you set a tool for the job, it takes care of keeping the work true and straight . . . helps you produce attractive, professional-looking work.

There's a store near you—perhaps right in your own neighborhood — that carries Delta tools. The people there are looking forward to giving you the complete Delta *quality* story. Drop in to see them.

## FREE!

**"Happiness Herald"** —an illustrated tabloid newspaper with facts about woodworking as a hobby. Tells how this popular hobby aids mental health and happiness . . . how it can pay its way. Pictures typical shops and projects. Enjoy its inspiration and ideas. Use coupon.

**Tear out coupon and mail today!**

THE DELTA MANUFACTURING CO.
683E E. Vienna Ave., Milwaukee 1, Wis.

*Please send me my free copy of the "Happiness Herald."*

Name.....

Address.....

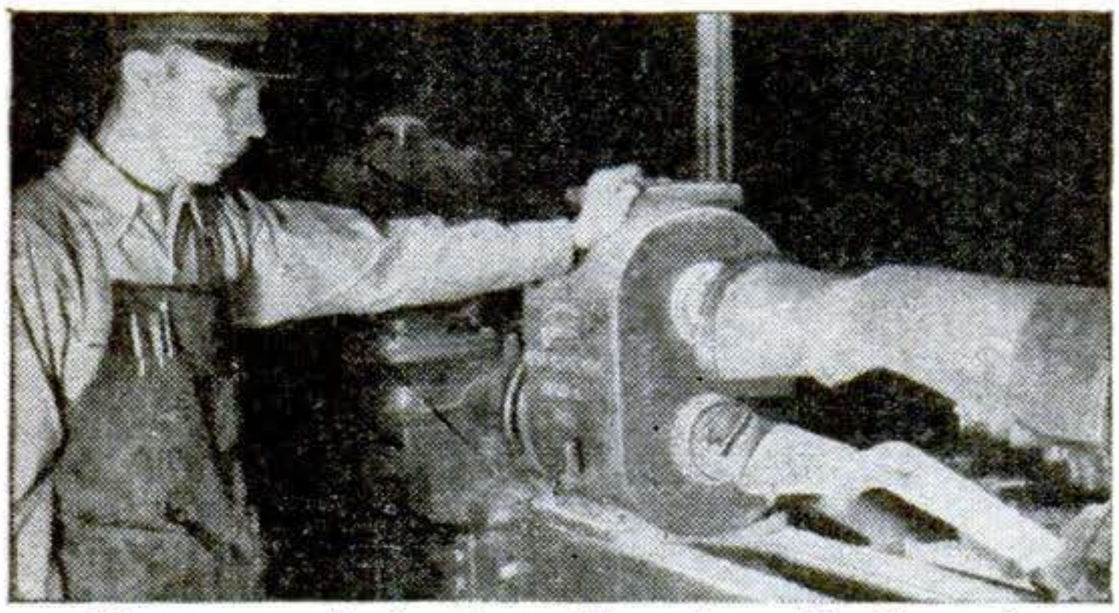
City.....(....) State.....



Copyrighted material

# THE MAKING OF *Marlin* GUNS

***Marlin brings to sportsmen, through this series of advertisements, interesting facts on gun-making . . . to enhance appreciation of fine sporting firearms and to encourage their thoughtful handling and care.***



*New automatic electric machines shape Marlin stocks*

**GUNSTOCKS** • Functioning, balance and beauty of firearms are all affected by design and quality of gunstock. Only selected hardwoods go into Marlin stocks. Blanks are turned in new automatic machines which handle sharper, more intricate forms than any hitherto developed. The heavy, cast iron "master" accurately controls triple cutters as the lathe turns. After turning, the stock is "shaped" by skilled craftsmen; sanded, polished, stained and finished.

*Final assembly demands fine craftsmanship*

**ASSEMBLING** • Interchangeable parts make for efficient, economical production. Deft hands and experienced eyes, however, are needed for the accurate work of final assembly.

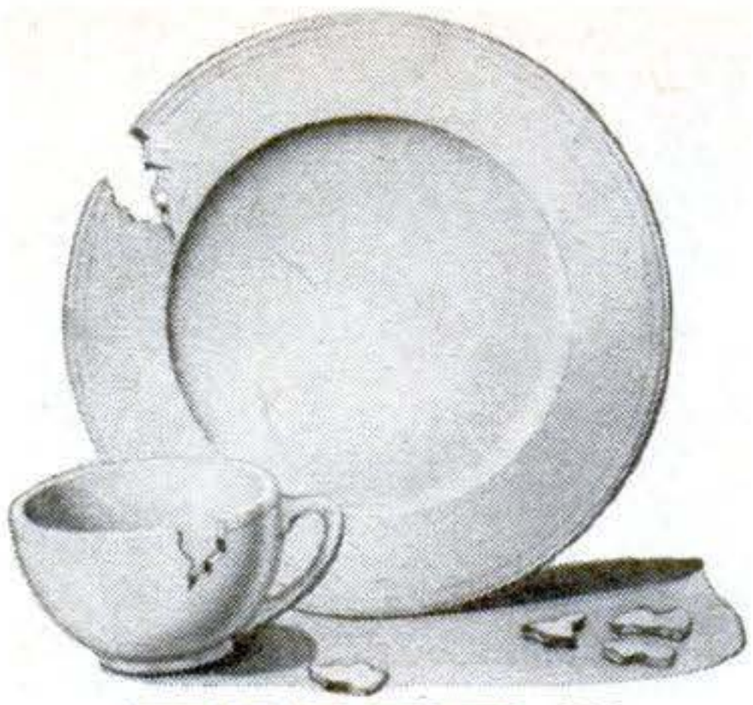
**TARGETING** • In the four modern ranges at Marlin, expert marksmen target every rifle before shipment. Sights are carefully adjusted until shots group in the center of the bull's-eye.

*Expert marksmen target Marlin rifles*

THE *Marlin* FIREARMS CO.
NEW HAVEN, CONN. EST. 1870

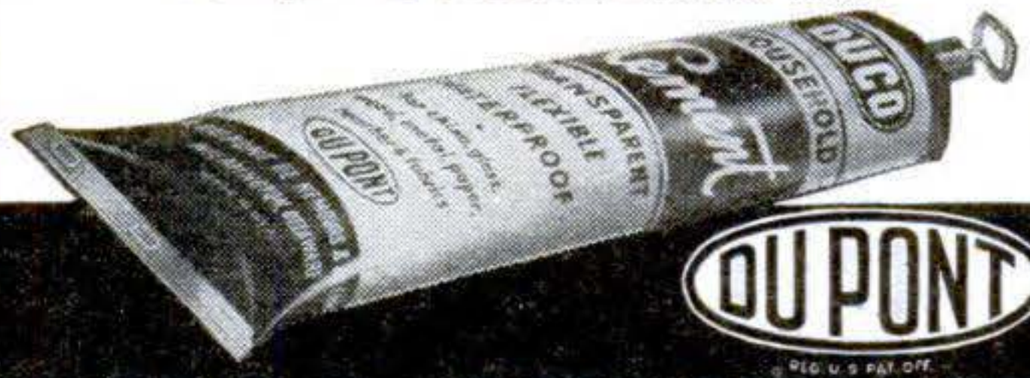
*(The next advertisement in this Marlin series will reveal more interesting facts on fine gun-making.)*

*Be sure to see Marlin 1946 models on display at your dealer's*



# FIXES
## BROKEN CHINA

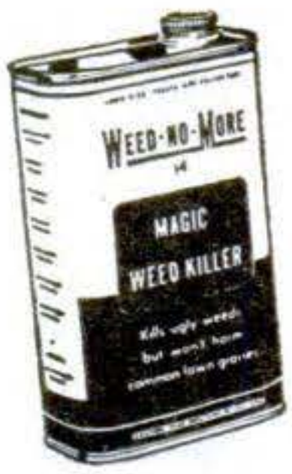
. . . also glassware, luggage, toys and furniture. It's transparent and waterproof. Makes models, too.




DU PONT
REG. U. S. PAT. OFF.

**DUCO CEMENT**
REG. U. S. PAT. OFF.

## $1 RIDS YOUR LAWN OF UGLY WEEDS!




**WEED-NO-MORE**

*Magic Weed Killer*

**Destroys Ugly Weeds but Won't Harm Common Lawn Grasses!**

**NO MORE** back-breaking digging! Destroy ugly leafy weeds with WEED-NO-MORE!

The 8-ounce lawn-size package treats 1600 square feet! Now *you* can enjoy a beautiful weed-free lawn for *only* $1!

WEED-NO-MORE kills dandelion, plantain and other ugly weeds—yet won't injure soil.

Get it today! Rid your lawn of ugly weeds for only $1. Just spray on . . . WEED-NO-MORE!

**On Sale at Paint, Hardware, Garden Supply, Department and Drug Stores**

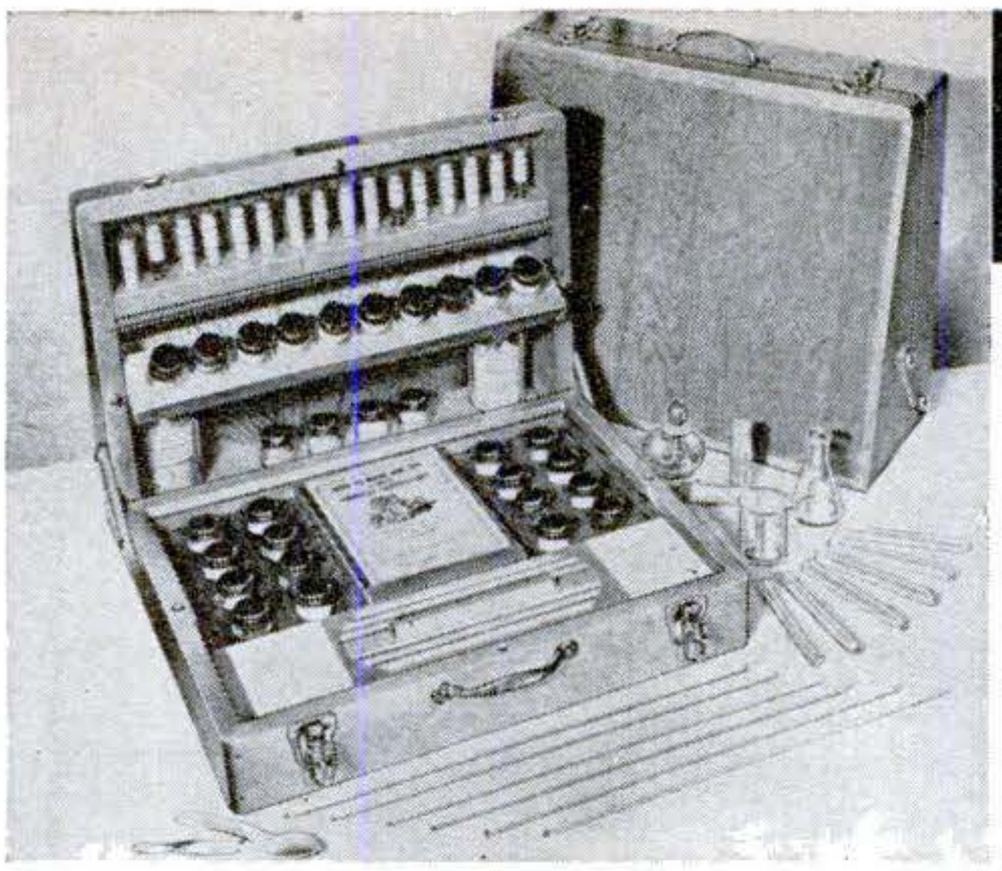
**WEED-NO-MORE**

**THE AMAZING NEW WEED KILLER**

***Made by THE SHERWIN-WILLIAMS Co. Cleveland, Ohio***



Copyrighted material



# Interested in Chemistry?

**THIS MODERN, COMPACT, PROFESSIONAL-TYPE CHEMISTRY KIT SERVES AS A PORTABLE CHEMICAL LABORATORY. MERCK & COMPANY CHEMICALS. TOP QUALITY MATERIALS THROUGHOUT.**

The atom bomb, the new war-born synthetics, plastics and textiles have focused America's attention on chemistry. To meet this widespread interest, Kit Corporation has produced a complete professional-type chemical laboratory kit to enable hobbyists and students to perform a wide range of experiments. These kits are currently being used by leading colleges and universities to expand their laboratory facilities to care for the greatly increased enrollment in advanced chemistry courses. More and more companies are looking for men who understand the fundamentals of chemistry. Many advanced hobbyists who studied and experimented with chemistry purely for their own amusement have suddenly found that their hobby is paying them big dividends in advancement and more pay.

Write for free descriptive literature and your dealer's name. If your dealer is out of stock, shipment can be made direct to you.

The Kit Corporation Senior Kit contains chemicals manufactured by Merck & Company, standard textbook on chemistry, Pyrex Erlenmeyer 50cc flask, six chemical test tubes, test tube holder, Pyrex beaker 50cc, six chemical vials, built-in test tube rack, wooden spatula, 100 strips blue and 100 strips red Litmus paper, six 12" strips glass tubing, atomic element and weight charts, chromium plated forceps, alcohol lamp, and 5cc pipette. All these materials contained in a beautifully finished wood cabinet 18" wide x 14" high and depth tapering 7" to 4". Weight 20 lbs. Two bottom trays removable, leaving a water-proof bottom which acts as a chemical resistant laboratory table. **$29.50**

Kit Corporation also manufactures the compact, well-balanced Junior Chemical Laboratory Kit, at $14.95, and the Young Scientist Chemical Lab-ora-toy at **$4.95.**

*This authoritative, 140 page chemical experiment book is part of the kit.*

**KIT Corporation**

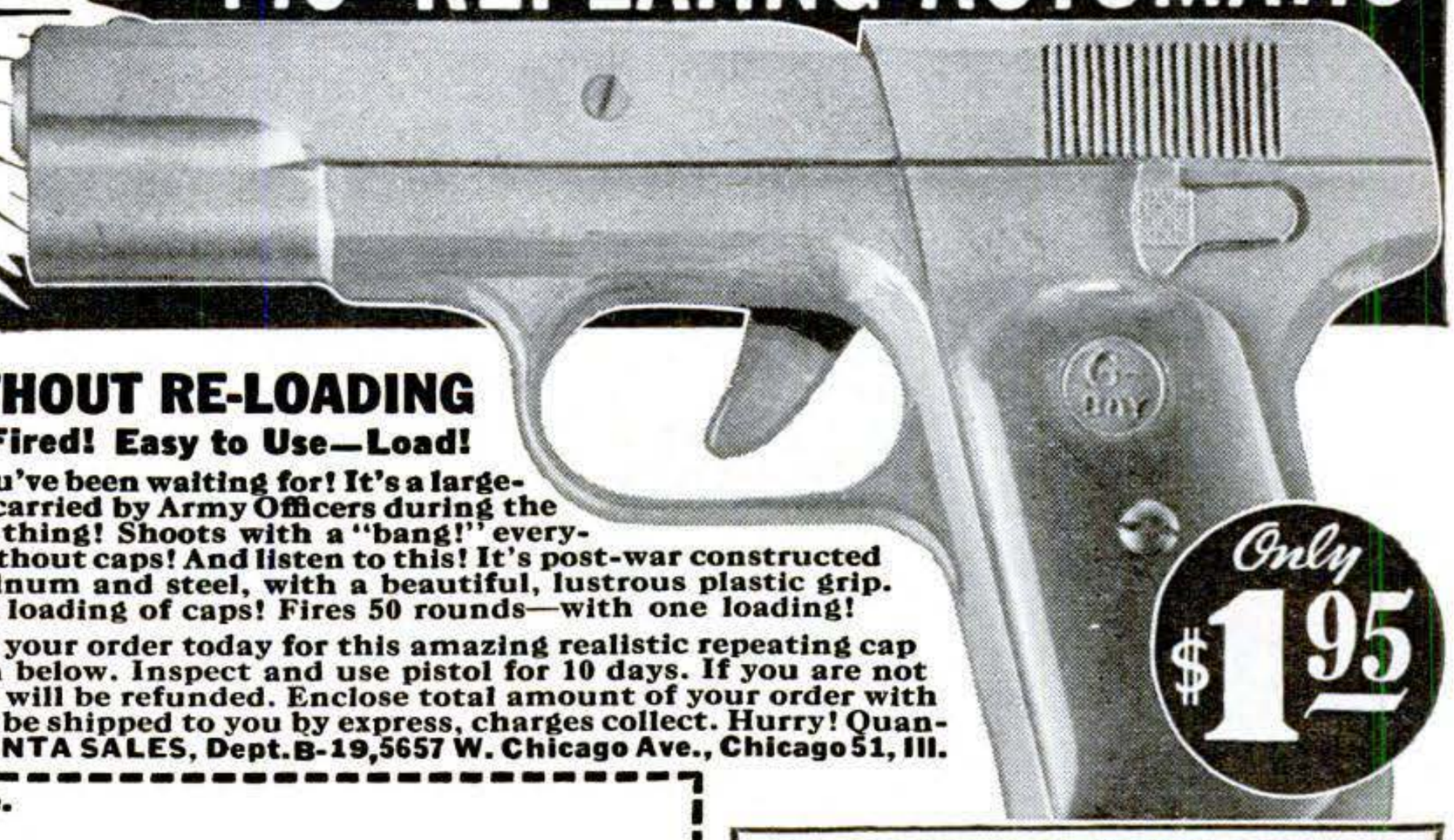
212th STREET AND JAMAICA AVE.
QUEENS VILLAGE, N. Y.

---

# THE IDEAL TOY FOR BOYS!

## "ARMY OFFICERS" .45 REPEATING AUTOMATIC

**CAP PISTOL**



## FIRES 50 ROUNDS WITHOUT RE-LOADING

**Barrel Actually Smokes When Fired! Easy to Use—Load!**

**Boy-oh-Boy! This is the cap pistol you've been waiting for! It's a large-size model of the Colt .45 Automatic carried by Army Officers during the war. Feels and handles like the real thing! Shoots with a "bang!" every-time you pull the trigger...with or without caps! And listen to this! It's post-war constructed inside and out of long-lasting aluminum and steel, with a beautiful, lustrous plastic grip. Pistol "breaks" open for easy inside loading of caps! Fires 50 rounds—with one loading!**

**MONEY-BACK GUARANTEE! Rush your order today for this amazing realistic repeating cap pistol and ammunition. Use coupon below. Inspect and use pistol for 10 days. If you are not delighted, return it and your money will be refunded. Enclose total amount of your order with coupon. Pistol and ammunition will be shipped to you by express, charges collect. Hurry! Quantity limited! Rush your order now! SANTA SALES, Dept. B-19, 5657 W. Chicago Ave., Chicago 51, Ill.**

Only $1.95

**SANTA SALES, 5657 W. Chicago Ave.**
**Dept. B-19, Chicago 51, Ill.**

Please rush_____"Army Officers" .45 Automatic Repeating Cap Pistols at $1.95 each. _____Boxes of 250 ROUNDS of CAPS at 15c each, or _____ Boxes of 1750 ROUNDS of CAPS at $1.00 each. I enclose $_____ full amount of order. Please ship express, charges collect. If I am not delighted with pistol, I can return it in 10 days and get my money back.

Name.....

Address.....

City.....State.....

**ORDER AMMUNITION**

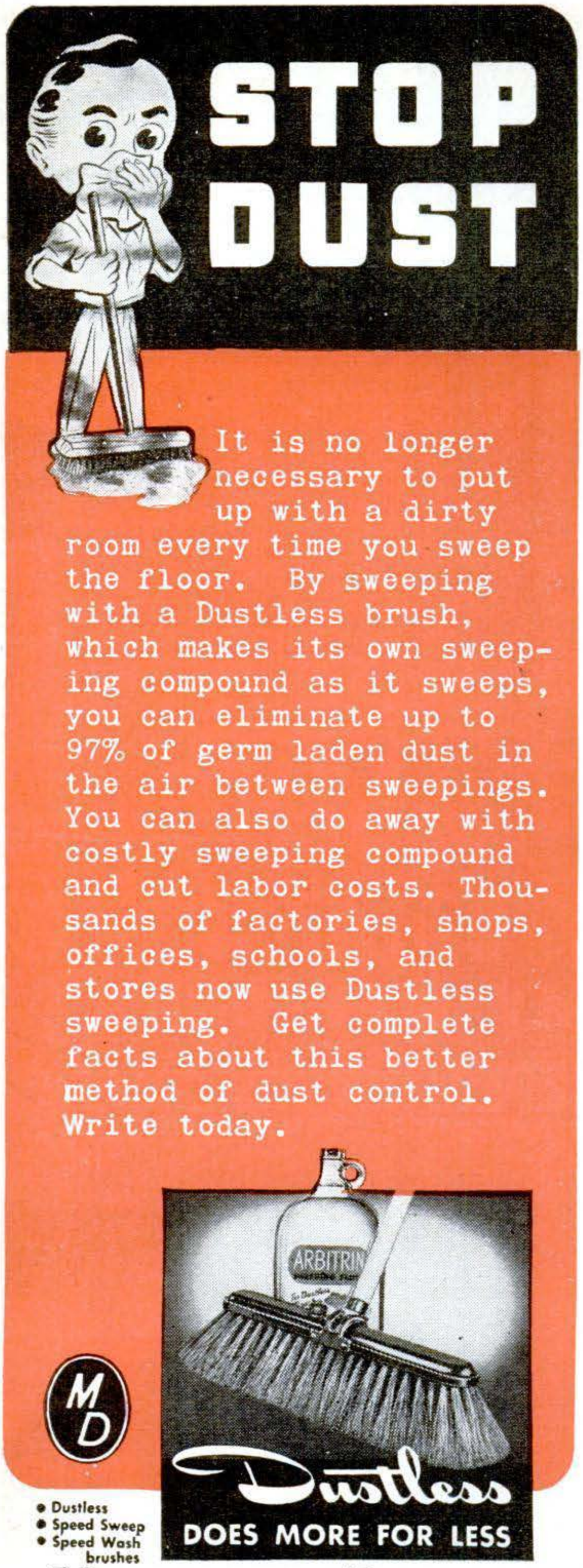
Box of 250 Rounds of Caps . 15c
Box of 1750 Rounds of Caps . $1.00

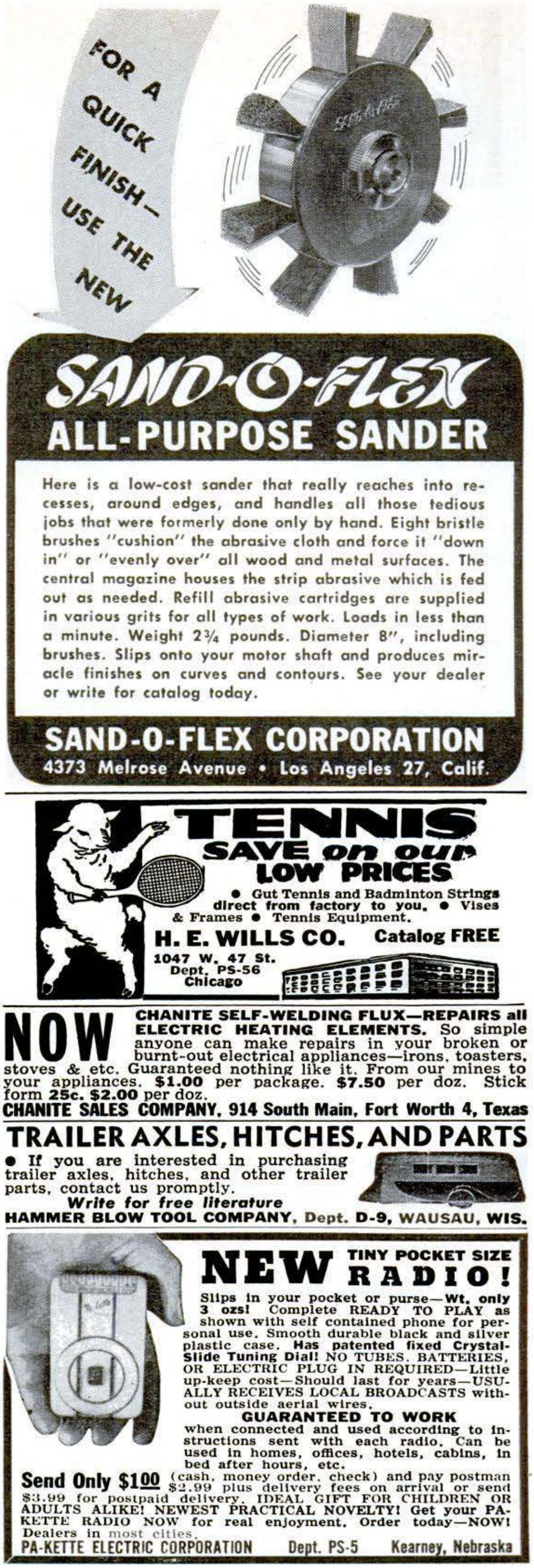
Have more fun with your repeating cap pistol! Keep a good supply of roll caps on hand.

**CAPS NOT SOLD WITHOUT GUN**

Order blank for additional supplies of caps included with your shipment.

Copyrighted material







Copyrighted material

# The O'BRIEN ALL-STEEL HYDRAULIC BUMPER-JACK

**Built to Lift 2 Tons**

***With Finger-Tip Pressure***

**LATEST, FINEST ENGINEERED, MOST RUGGEDLY CONSTRUCTED JACK ON THE MARKET • A LIFE-TIME ACCESSORY • • •**

1—All Steel Construction.
2—Solid Steel Piston—3 Telescoping Steel Tubes Quadruples its strength.
3—Adjustable Hook-Over 15 inch range.
4—Finger Pressure Hydraulic Stroke.
5—No Screw Parts To Rust.
6—17¼ inch Hydraulic Hoist. Leakproof.

**LIFETIME GUARANTEE AGAINST DEFECTS. PERFECT WORKMANSHIP.**

**$13.50** F. O. B. Chicago

If your dealer can't supply you, remit $13.50 and we will ship immediately. Money cheerfully refunded if not satisfied.

***Wanted:* DEALER-AGENTS**

**AUTO PRODUCTS CO.**
Dept. S-5
6349 N. Clark St., Chicago 26, Ill.

---

**arc welding manual *and* text book...$2.00**

• Teaches you how to become an arc welding operator – one of highest paid trades today. Write today!

**Hobart Bros. Co.,** Box P-562 Troy, Ohio

---

**Low Price**

## The OTTAWA "Buzz" Master

FREE Details

**CLEARS LAND FAST!** Powerful 6-HP motor with friction clutch for safe operation. Cuts down timber, brush and hedge; turn blade vertical; saw logs to length. Can be equipped to fell largest trees. Has clutch pulley for belt work; guaranteed.

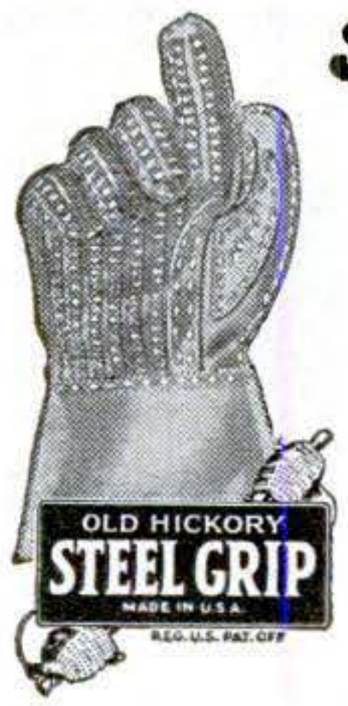
**OTTAWA MFG. COMPANY, 501 Brush Ave., Ottawa, Kans.**

---

**Say You Saw It In Popular Science**

---

# *SAVE HANDS SAVE TIME*

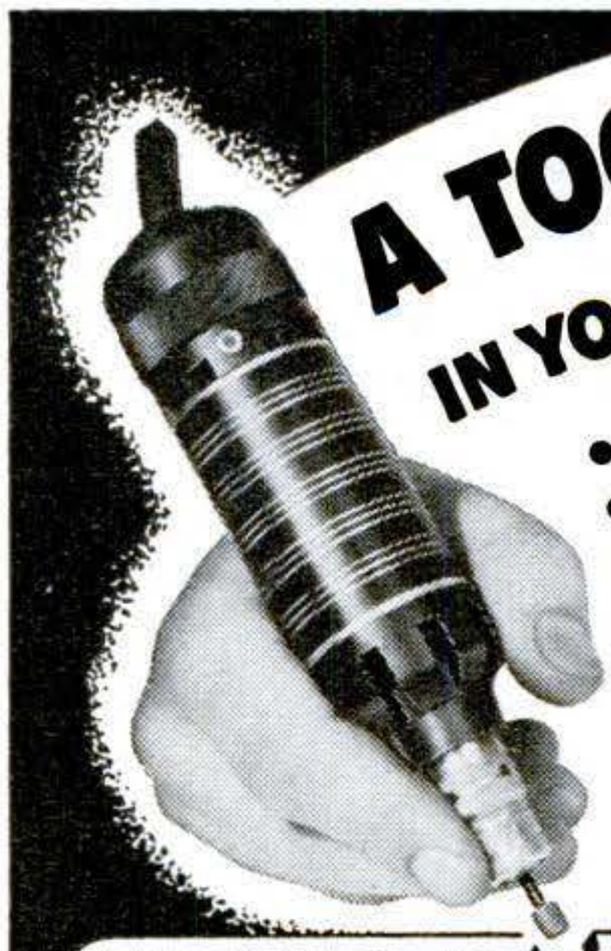



## with Steel-Grip Gloves

With not a moment to be lost, keep men at work and materials moving with Steel-Grip chrome tanned cowhide gloves. Steel ribbons over tough leather strips; palm and fingers reinforced, for utmost wear. Handle rough, heavy, sharp materials with speed and safety and sureness. Or what's your problem? Over 4300 proven Steel-Grip safeguards may give you an *immediate* answer. Used by big industrials since 1910. Write for catalog or state your need today.

**INDUSTRIAL GLOVES CO.**
653 Garfield Blvd., Danville, Ill.
*Canada: Safety Supply Co., Toronto*

---



# A TOOLSHOP IN YOUR HAND!

• GRIND • DRILL • ROUT
• POLISH • ENGRAVE
• CUT • SAND • SAW • etc.

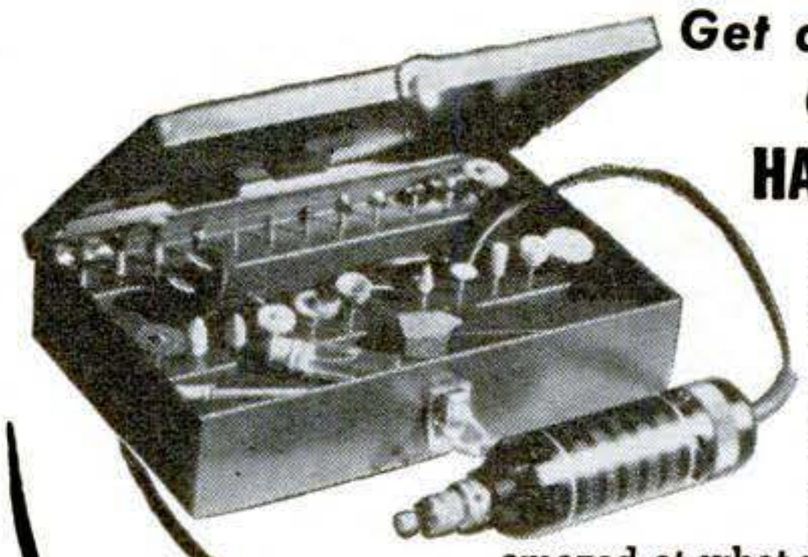
MAKE THINGS FROM WOOD PLASTICS—METALS—GLASS LINOLEUM—LEATHER ALLOYS—HORN—STONE BONE, etc.

**HANDEE** TOOL OF 1001 USES

Smooth, steady power at your fingertips! You can turn out professional looking projects for pleasure or profit—ship, plane or train models, costume jewelry, wood carvings, puppets, initialed tumblers, etc. Handee, first small portable tool and today's finest, uses 300 different accessories. AC or DC. 25,000 r.p.m. Weight, 12 oz.

WITH 7 ACCESSORIES, POSTPAID **$18.50**

***Get a Good Start***
***Get the***
## HANDEE KIT

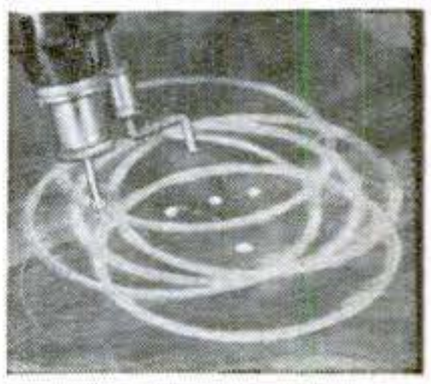


HANDEE Tool and 45 of the most popular accessories, all packed in handsome, compact steel carrying case. You'll be amazed at what you'll accomplish! Complete, postpaid **$25.00**

*FOR YOURSELF OR A FRIEND... THE GIFT OF A LIFETIME!*

## NEW PRECISION ATTACHMENTS

Fit DeLuxe Handee only. Enable novice or craftsman to perform precision operations not possible with other portable tools. Magically, easily, your offhand carving, routing, shaping, etc. is perfect as to depth of cut, accuracy of line. Set of 6 attachments with instructions, postpaid **$7.95**



ARMY E NAVY

**ORDER NOW—USE COUPON**

**FREE 64-PAGE Catalog**

**CHICAGO WHEEL & MFG. CO.**
**1101 W. MONROE ST., DEPT. PO,**
**CHICAGO 7, ILL.**

Send me ☐ HANDEE TOOL ☐ HANDEE KIT ☐ PRECISION ATTACHMENTS ☐ REMITTANCE ENCLOSED ☐ SEND C.O.D. ☐ SEND 64-PAGE CATALOG.

Name.....

Address.....

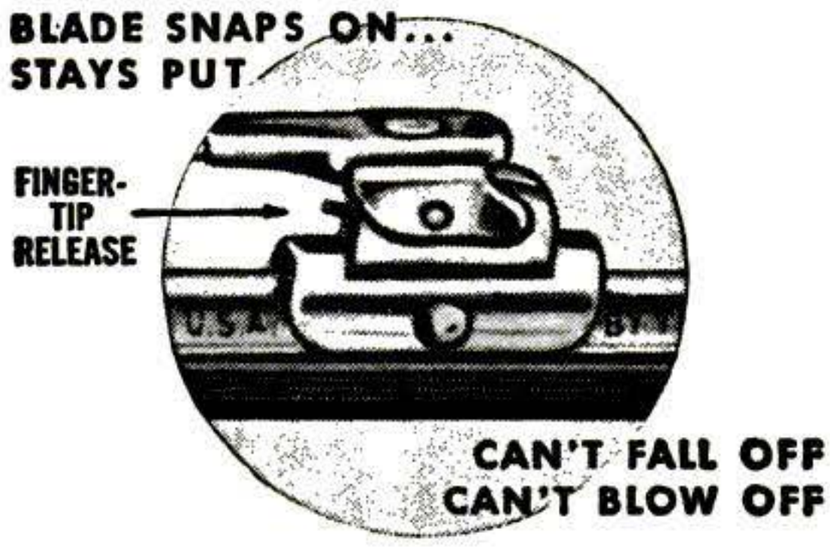


Copyrighted material

# ANCO RAIN-MASTER

## "Dead-Locker"

**WINDSHIELD WIPER ARMS and BLADES**




(A war-born invention—by ANCO—first for military aircraft—now for your car.)

## DON'T SHOOT YOUR GAS-PUMP MAN!

He's doing the best he can. Sure, he knows how dangerous it is for you to drive your car . . . in stormy weather . . . with your dull old windshield wipers that smear and smear. He'd gladly put on for you quickly a pair of keen new ANCO RAIN-MASTER Wiper Blades and Arms. He has them—Newest Models! But he forgets to remind you? Too busy? You can't shoot him for that!

After all, it's *your* car to protect. So *you* remind *him*. Get RAIN-MASTERS . . . patented features . . . original equipment on many makes of high grade cars and trucks . . . used in war—on our fighting tanks and trucks and ships and bombers too...because ANCO RAIN-MASTERS clean quicker, clean cleaner . . . last longer. May save you a costly smashup.

Ask for RAIN-MASTER Windshield Wiper Arms and Blades next time you buy gas.

**THE ANDERSON COMPANY**
*Established 1918*
GARY, INDIANA

# Save 1/2

## MAKE YOUR SPARE TIME PAY!

**Assemble These Beautiful Home Furnishings Yourself**

***NO TOOLS . . . NO WORKSHOP NEEDED!***

Your spare time is worth money! Make these smart, modern furnishings for your home . . . or as luxurious gifts for your friends! Styled by Paul Hudson Stanley, nationally known designer, these ultra-new accessories combine the natural beauty of clear-grained Harvest Oak and the trim lines of sparkling Lucite!

**IT'S EASY AND IT'S FUN!**

A tabletop Hobby! Each beautiful accessory comes in *complete* Kit form. All parts and materials of selected woods and gleaming Lucite are accurately pre-cut and ready for assembly. Nothing to cut, carve or shape . . . NOTHING ELSE TO BUY! Step-by-step instructions guarantee easy assembly, beautiful results!

***HERE'S HOW YOU SAVE ONE-HALF!***

Leading stores now feature *identical* items at assembled retail prices exactly DOUBLE your cost for complete Hobby Kits! You SAVE ONE-HALF . . . make your spare time PAY by building these articles with your own hands! For Pleasure and Profit . . . write today for free details of this enjoyable new Hobby!

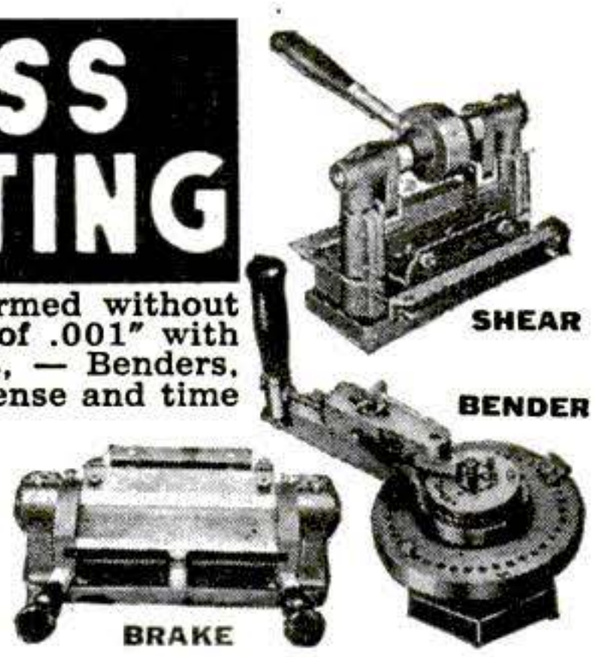
**HOMECRAFTERS GUILD Dept. F-5**
**360 N. MICHIGAN AVENUE • CHICAGO 1**

# DIE-LESS DUPLICATING

Many small parts can be formed without dies, to duplicated accuracy of .001" with DI-ACRO Precision Machines, — Benders, Brakes, Shears. Save die expense and time delay. Ideal for experimental and research work, making samples, models, etc. as well as regular production runs.

**Write for descriptive literature.**

**O'NEIL-IRWIN MFG. COMPANY**
342 8th Ave. South, Minneapolis 15, Minn.




# REPAIR FURNITURE

*WITH THE GLUE THAT MANUFACTURERS USE*

## FRANKLIN GLUE

*GENUINE LIQUID HIDE GLUE*

**READY-TO-USE**

Makes joints stronger than the wood itself. No mixing — No heating — No unpleasant odor — No chilled joints.

THE FRANKLIN GLUE CO., COLUMBUS 15, OHIO

AT YOUR HARDWARE DEALER



Copyrighted material

# RIDE A NEW HARLEY-DAVIDSON

## DOWN THE ROAD TO HAPPINESS

THAT letter tells the whole story! Thousands of enthusiasts are eagerly looking forward to good times in the world's greatest sport — motorcycling! Be ready to ride *your own* NEW HARLEY-DAVIDSON on fun-filled vacation trips — or take in race meets, hillclimbs, endurance runs and other thrill-packed motorcycling events! See your Harley-Davidson dealer EARLY — and send the coupon NOW!

# HARLEY-DAVIDSON *Motorcycles*

**HARLEY-DAVIDSON MOTOR COMPANY, Dept. PS, Milwaukee 1, Wis.**

Please send at once free copy of 24-page "Enthusiast" Magazine, filled with motorcycle action pictures and thrilling stories.

*Name*.....

*Address*.....

*City*.....*State*.....

Copyrighted material

# TWO FAMOUS LINES - NOW BEING MADE IN Nylon

## *The Top in Casting Lines*

World-famed Black-Oreno is back—in Nylon! Hard braided, waterproofed, exceptionally smooth, it's easy to cast and has the great long-lasting quality for which this dependable line is famous. 6 tensile tests: 12, 15, 20, 25 and 30 pound.

## *The Top in Fly Lines*

Excel-Oreno has always been known for long wear and dependable service. Now braided of Nylon, finished with exacting, painstaking care, Excel-Oreno is now your best *investment* in fly lines. Level lines, H to C, in 25-yard coils. Double tapers—HEH, HDH and HCH—30-yard coils.

**LINE-ORENO NYLON IS BACK, TOO!**

This original South Bend Nylon casting line is an unusually serviceable line of exceptionally long life. 12, 15, 20, 25 and 30 pound test.

**FISHING PHOTO BOOK — FREE!**

Send for this 48-page book packed with fishing *action* photos—all prize winners in the South Bend Bait Company Fishing Photo Contest.

**SOUTH BEND BAIT COMPANY**
**892 S. High St., South Bend 23, Indiana**

# SOUTH BEND

*A Name Famous in Fishing*

# *Here We Go!*

**Cushman** MOTOR SCOOTER

OVER 75 MILES PER GAL

The CUSHMAN, during recent years, has proved itself to be so amazingly useful and economical that the demand, today, is terrific. If you want a CUSHMAN this season, we urge you to see your dealer or write us—IMMEDIATELY!

**POWERFUL:** 4 H.P. engine—new low and high gear supplies power for steepest hill. Floating Drive applies power smoothly. **ECONOMICAL:** 400 miles per $1 worth of gas! **SPEEDY:** Up to 35 miles an hour! **COMFORTABLE:** Special springing, long wheel base, balloon tires. **SAFE:** Low center of gravity, heavy brakes. Durably constructed of finest materials. Thousands in use.

Made in several models for carrying extra passenger or heavy loads. Standard, shown above (windshield and tandem seat are extras)—or 3-wheel Side-Kar or 3-wheel Package-Kar.

*Write* *See your CUSHMAN dealer. Or, send for full details on all models. Send Today!*

**CUSHMAN MOTOR WORKS, Dept. S-14 Lincoln, Nebr.**

# FREE!! 40 PAGE HOBBY CATALOG

**Over 1000 items — Over 300 Photos**

Our new 40 page catalog is the "bible" of wide-awake modelers. Hundreds of models to choose from! Planes, engines, boats, jeeps, tanks, gliders, supplies, etc. Send for yours today!

NEW THOR 1/6 H.P. GAS ENGINE . . . $10.20 P.P.

**AMERICA'S HOBBY CENTER, INC.**
**Dept. S56, 156 W. 22 St., N. Y. 11, N. Y.**

# SMALL HOLE SET OF THREE TOOLS

$3.95

SEND CHECK OR M.O. WE SHIP POSTPAID

A fine set of hardened, ground and polished precision tools—ALENIZED to resist acid stains etc.—for measuring holes, slots etc. 3/32 to 5/16 inch. We will ship in a nice VELORTEX case at $1. additional.

**ALCO SHOP, Dept. 5, 1459 Sunset, Los Angeles 26, Calif.**

# BUILD YOUR OWN FAST FREEZER

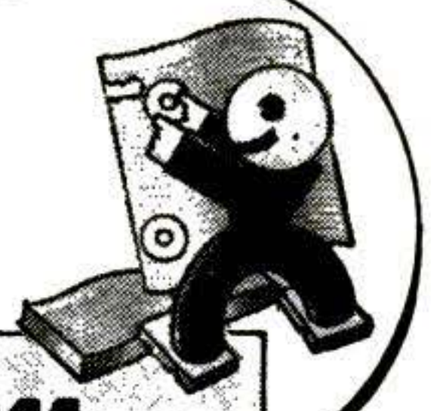
PLANS $1.00

It's easy to build this household appliance and profitable to use. Save up to 75%. Operates on 110 or 32 volts. Plans show 5 sizes and are easy to follow. **ENJOY MAKING ONE OF** these freezers from new or used parts. No expert knowledge needed. Mail $1.00 bill or check for complete plans and catalog.

5 sizes 8 to 40 cu. ft.

**LE JAY MFG., 423 LeJay Bldg., Minneapolis 8, Minn.**

What keeps the pages nice and neat
And guarantees the set's complete?



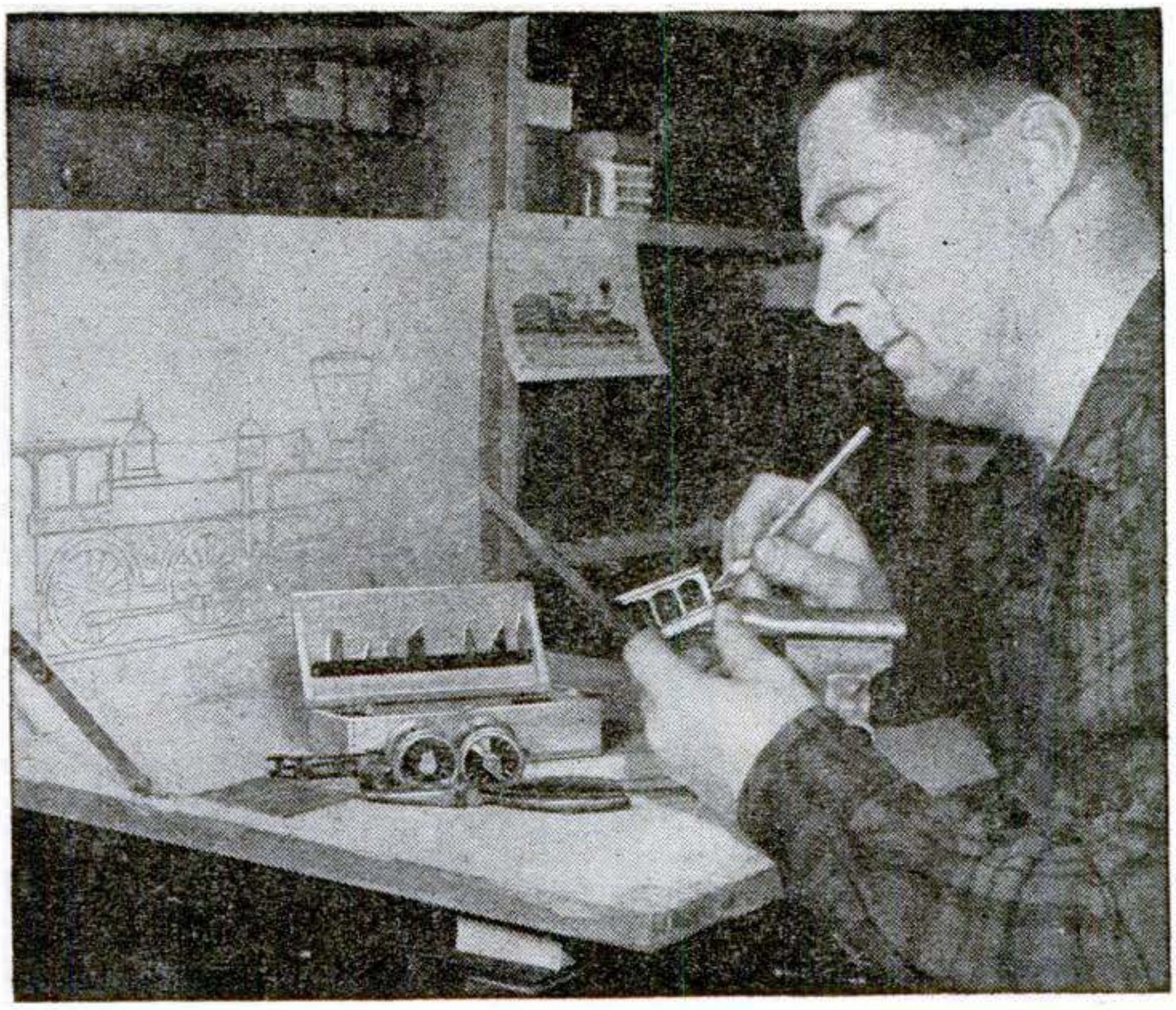
**Dennison**

**GUMMED REINFORCEMENTS**

**At Stationery Departments Everywhere**



Copyrighted material



# BURBANK DOES IT!...SO CAN YOU!

## How Expert Model Builder Gets Topnotch Results

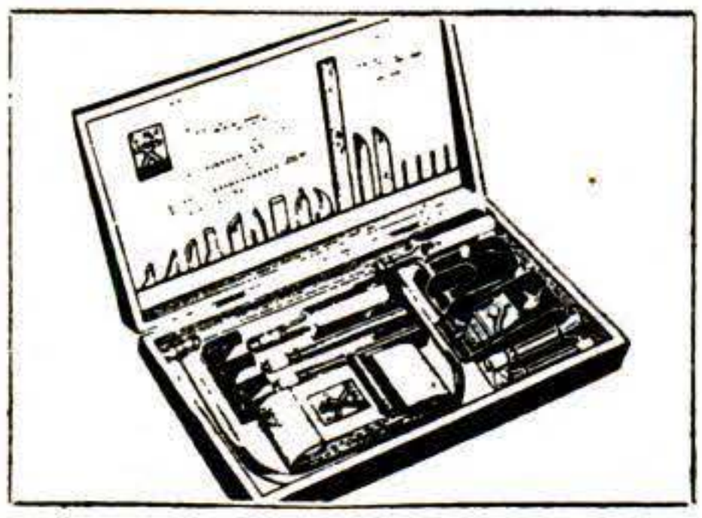
James W. Burbank, of Narrowsburg, N. Y., builds scale models of famous old locomotives. He's a perfectionist. When he finishes a model, it looks real enough to chug off under its own steam.

Here you see him finishing the inlaid walnut cab for his model of the Erie's old George C. Bernard, speed demon of the 1870's. You see, too, three good reasons why he turns out such beautiful work, i.e., the picture of the original engine; his own accurate scale design; *and* his *indispensable* X-acto Knife Set.

"X-acto Knives are tops," says hobbycrafter Burbank. "They're so versatile. I can find a blade-handle combination for the toughest or most delicate jobs . . . And those little pin vises . . . their heads fit my hands perfectly. I recommend X-acto to every model builder!"

### Be Expert At Your Hobby!

X-acto adds skill to your wrist. Smooth-cutting, easy to use as a pencil, X-acto is the indispensable tool for whittlers, wood carvers, artists, photographers.



**No. 85 X-acto Tool Chest** – 3 all-metal knives; full assortment of blades; saw; sander; stripper; planer; 2 drill holders; 10 drills; 6" steel ruler; Complete in wooden chest, $12.50. Also #84 Set, $7.50.

**X-acto** *
**KNIVES & TOOLS**

X-acto Knives & Knife Chests From 50c to $5.00

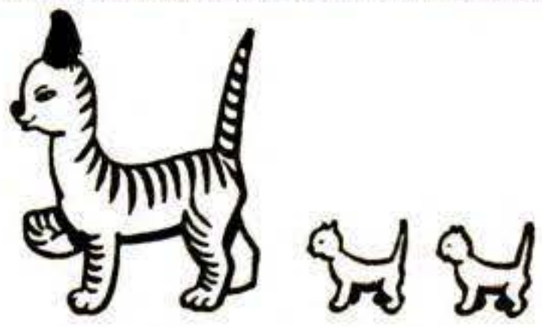
Buy where you see this sign. At better hardware, hobby and gift shops – or if not available write direct to X-acto Crescent Products Co., Inc., 440 Fourth Avenue, New York 16, N. Y.

*Reg. U. S. Pat. Off.

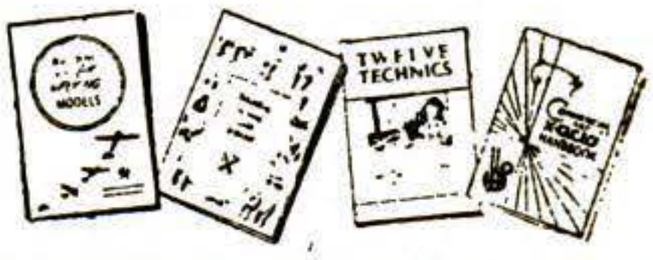
## V is for Versatile ...as in X-ACTO!

X-acto's 3 handle styles and 13 blade shapes fit every type of cutting job. But if you're a one-knife man, we recommend for all-round work . . .

**X-ACTO No. 2 KNIFE,** with solid duraluminum handle, made with new improved chuck collet. Knife alone, 50c. With 5 assorted blades, in #52 Set, $1.

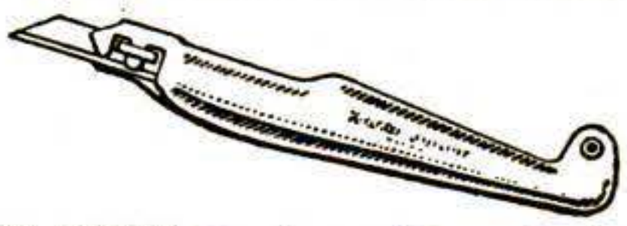


**WHITTLE A LITTLE?** Send 10c for a copy of "Whittling Is Easy with X-acto!" You'll be an expert in no time.




**YOU'LL BE VERSATILE, TOO.** Send for these helpful booklets, 10c each.
(1) Building Your First Flying Model. (2) The Knife As a Drawing Instrument. (3) Commercial Artists Handbook. (4) How To Build Scale Model Planes.

**SAVES CUT FINGERS**—X-acto is designed for firm grip and sure control. Blades lock in, can't fold under. So much handier and *safer* than razor blades.



**OK, JUNIOR!** Here's your X-acto Junior Knife, shaped like a Spitfire fuselage, with a two-edged blade. All-metal. Only 25c.



Copyrighted material

# Great Moments of THE WAR!

—by Graflex

It's Free!

Read an exciting story of photography at war! Plus 26 of the war's great pictures—yours for the asking! Your local GRAFLEX Dealer has a FREE copy for you, or send 10¢ to cover handling, to Room 52, GRAFLEX, Inc., Rochester 8, New York.

VISIT Graflex Information Centers—At 50 Rockefeller Plaza, New York, N. Y., and 3045 Wilshire Boulevard, Los Angeles, Calif.

**GRAFLEX, INC.**

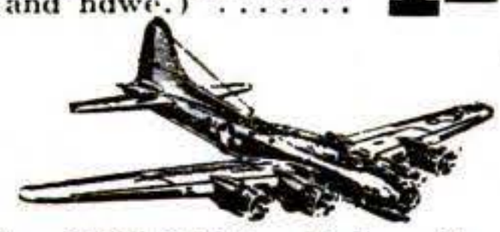


## ★ Build These Cleveland Models ★

**Lockheed "Lightning" P-38**
38¾" model of one of the AAF's most sensational fighters. MFM Kit SF-85 . . . $4.00

36" Industrial Train. Model. Kit T-85 . . . . $1.50

**Cleveland Tether "SHARPIE"**
Lowest price line-controlled gas model yet offered. A. B. C. engines. Kit GPL-5023 (less motor and hdwe.) . . . . . $1.00



**Boeing B-17 "Flying Fortress"**
Known as most famous plane of World War 2. Perfect memento of the AAF. 77¼" span. MFM Kit SF-100 . . . . . $12.50

**SEE YOUR DEALER FIRST.** In ordering direct, add 20c extra for packing-postage. **CATALOG 5c** (Circular free)

**CLEVELAND MODEL & SUPPLY CO.**
4508F46 Lorain Ave. ★ ★ ★ Cleveland 2, Ohio, U.S.A.



**PULVEX FLEA POWDER** DDT

now also contains

Guaranteed by Good Housekeeping — Replacement or Refund of Money if Defective or Not as Advertised Therein

Kills the fleas QUICKLY!
Keeps others off for days!
Still 25c and 50c



## SECRETS OF LOCKSMITHING

At last in handy pocket size. Written by experts, after years of experience. Practical, simple instructions on Key Duplicating, Key Fitting, Lock Repairing, Changing Combinations, Master Keying, Lock Opening, etc. Hundreds of illustrations. Learn easily at home. Total Cost $1.00. Send $1.00 today—Satisfaction or money back guaranteed.

REPAIR SHOP SERVICE, Box 264-B Skokie, Illinois



*Revolutionizing*

MAN'S VIEWPOINT ON PIPE APPEAL

*A rare combination of Craftsmanship and Style*

*Briar House Policy:*

To provide maximum smoking pleasure...to assure mellowness by using only carefully seasoned and patiently matured briar...to merit Good Will and Confidence by furnishing the best pipes for the money.

Buy EDWARDS...greater values than similarly priced pipes.

**Briar House**
1052 GREENE AVE. • BROOKLYN 21, N. Y.

**STOP CUSSIN'**
use **2-WAY** SPECIAL INSECT REPELLENT
Nash & Kinsella Labs., Inc. • St. Louis, Mo.



# *Real Relief*
## *for Rupture Sufferers!*

The Web Truss has brought comfort to thousands of satisfied users. Enthusiastic letters tell us it gives the wearer **real relief.** Scientifically shaped to do the job, made of strong washable materials, the Web Truss gives the RIGHT support WHERE NEEDED. Satisfaction GUARANTEED.

Write for FREE descriptive literature, or ask your druggist about the Web Truss.

**The WEB Truss Co., Dept. S-16, Hagerstown, Md.**

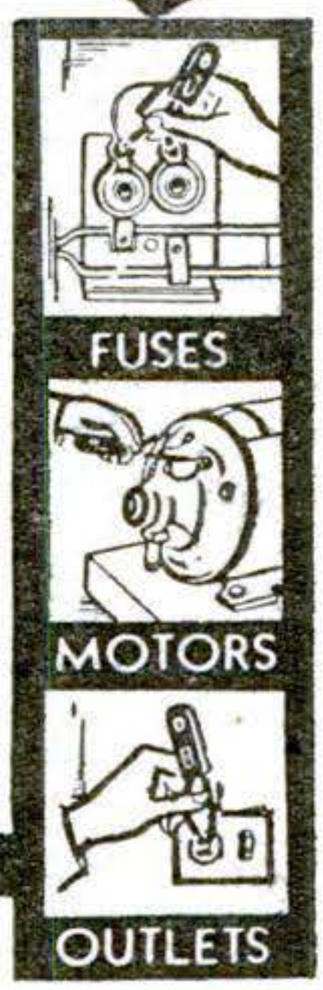



Copyrighted material

# Test-O-Lite the MODERN TROUBLE SHOOTER

**THE NEON GLOW**

**. . . LOCATES TROUBLE INSTANTLY** in electric circuits, fuses, cut-outs, motors, radios, appliances. Tests everything electrical from 100 to 550 volts. Indicates hot or grounded wires. Tells AC from DC. Engineers prefer it because it has patented safety features.




**PUTS "FINGER" ON THE TROUBLE SPOT - - QUICKLY**

Far superior to ordinary clumsy test bulb. Saves precious time. Indispensable in shop or home. Vest pocket size. Lifetime guarantee. List $1.50 (Pat. No. 1,778,883) Purchase through regular electrical dealers.

**L. S. BRACH MFG. CORP.**
200 Central Ave. Newark, N. J.



## IT'S FUN TO MAKE THINGS OF WOOD

**CONSTANTINE'S MANUAL TELLS HOW TO DO IT**

Beginner or expert will find many helpful hints and tips on veneering, woodfinishing, cabinet making, carpentry, etc. Describes and illustrates over 100 different kinds of wood and 980 different items for you. ALL AT MONEY SAVING PRICES. Includes Identification Panel & Chart of Over 60 Rare Woods in NATURAL COLOR. A source of supply for anything in wood regardless of quantity. Send only 25c in stamps or coin, 25c refunded or credited on first order so Manual costs you nothing.

**ALBERT CONSTANTINE & SON, INC.**
793-D East 135th St. New York 54, N. Y.



## BUILD YOUR OWN FAN

**with that old motor**

One piece cast aluminum propeller used for cooling and ventilating. Also available to dealers at discount.

| Size Inches | Polished 2 Blade | Polished 3 Blade | Unpolished 2 Blade | Unpolished 3 Blade | Bore Inches |
|---|---|---|---|---|---|
| 15 | $2.50 | $3.50 | $2.00 | $3.00 | 1/2 5/8 3/4 |
| 18 | 3.00 | 4.00 | 2.50 | 3.50 | 1/2 5/8 3/4 |
| 20 | 3.25 | 4.25 | 2.75 | 3.75 | 1/2 5/8 3/4 |
| 24 | 3.50 | 5.00 | 3.00 | 4.25 | 1/2 5/8 3/4 |
| 30 | 5.00 | | 4.00 | | 1/2 5/8 3/4 1 |

Plus 10% Excise Tax

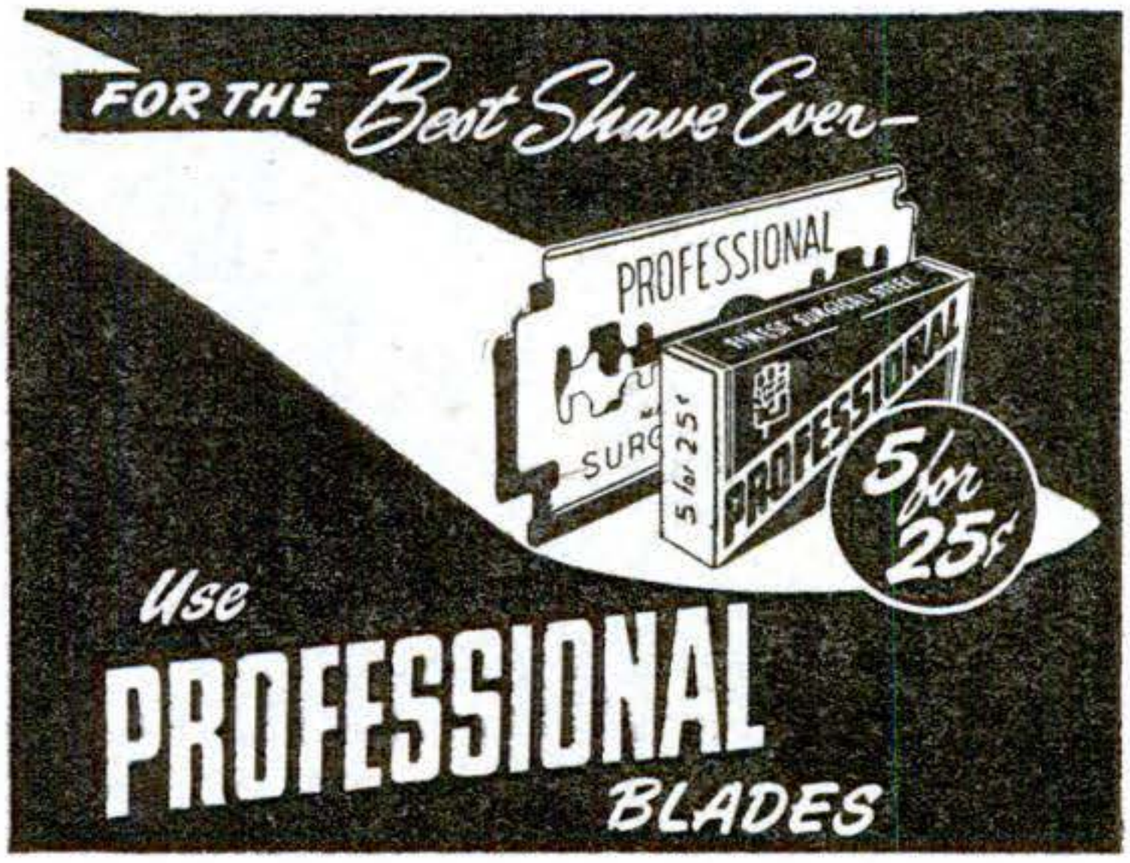
Let us give you our prices on your aluminum castings.

**KLOPPENBORG FOUNDRY Dept. H.C. Davenport, Iowa**



**LUCITE** Complete illustrated fabricating instructions, used in Craft Classes throughout the world, price list on Lucite, dyes, complete supplies. Booklet 10c, with sample 35c. GEM-O'-LITE, P.O. Box 686X, North Hollywood, Calif.



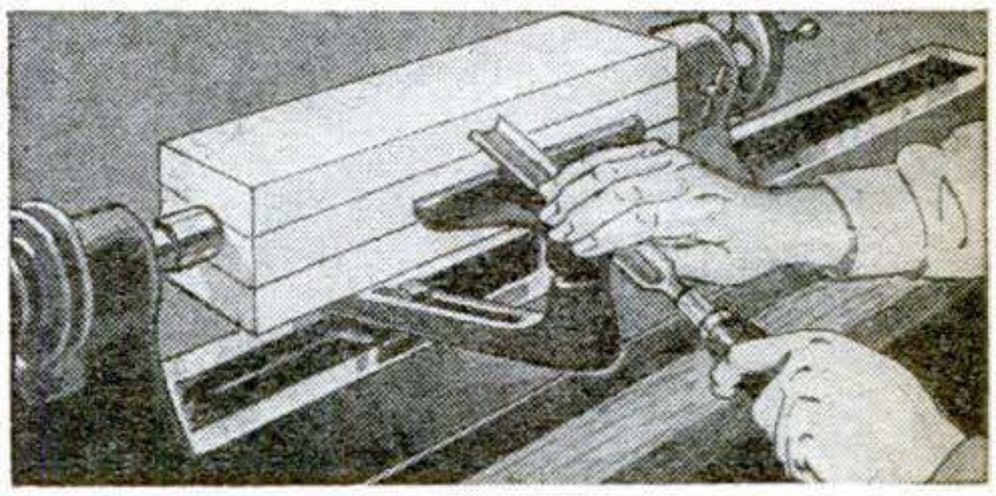





# WORKSHOP WISDOM

## Laminating waste stock for turning

MAKE use of your waste stock by laminating scrap pieces with CASCAMITE, because it's *strong, stain-free,* and *highly water-resistant.*



**To laminate waste stock**

Choose pieces of stock to roughly approximate finished size and shape. Plane surfaces to be glued so that they are perfectly smooth. Spread a thin film of CASCAMITE on the surfaces to be glued. Clamp and let set (at 70°F. or warmer) until glue is hard.

CASCAMITE is also recommended for laminating stock for table and chair legs, banisters, deep wooden bowls—wherever large dimensions discourage use of solid stock.

**A "cinch" you'll prefer—CASCAMITE**

**Easy to mix.** Just add CASCAMITE to cold water and stir.

**Strong.** CASCAMITE forms a bond stronger than the wood itself.

**Thrifty too!** Mix CASCAMITE as you need it. No waste.

Get CASCAMITE urea-resin glue—and CASCO, the standard casein household repair glue, at your hardware store in 10¢, 25¢, and larger sizes. For outdoor and boat work, use CASCOPHEN, the new, completely durable, waterproof resorcinol-resin glue.

**FREE GLUING GUIDE containing complete gluing directions plus helpful hints for household repairs. Free on request. Address a post card to Casein Company of America, Dept. PS-56 350 Madison Avenue, New York 17, N. Y.**

# CASCAMITE

***Dry Powder Urea Resin Glue***




Copyrighted material

# Now! A Better Soldering Tool... THE VANATTA KWIKHEAT THERMOSTATIC SOLDERING IRON

**Has Built-in Thermostat Control!**

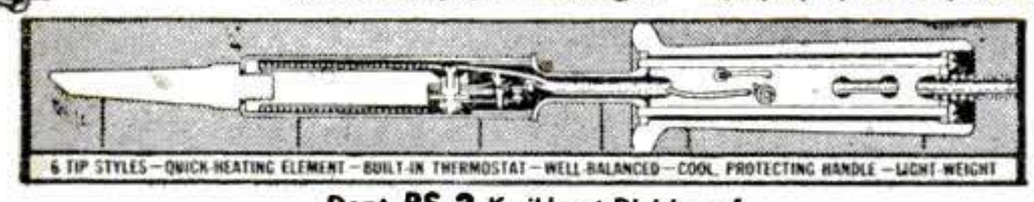
**HOT, READY FOR USE ONLY 90 SECONDS** after plugging in! **Kwikheat** is the only soldering iron with a thermostat built into the tool itself*—maintaining the proper level of heat for most efficient, economical operation. **SAFE! ... Cannot overheat—ECONOMICAL! ...** Lasts longer—saves tips and requires less retinning. **POWERFUL!**—225 watts—yet exceptionally **light weight** (14 oz.). **Well-balanced** with cool protecting plastic handle. Modern streamlined design. Six interchangeable tip styles adapt one Kwikheat Iron to all your soldering jobs. You will be proud to own America's finest and most versatile soldering tool...from tip to plug Kwikheat is in a class by itself. Ask your dealer to demonstrate the quick-heating feature now!

*patented

**6 TIP STYLES**

#0—$1.25
#1—$1.25
#2—$1.25
#3—$1.25
#4—$1.25
#5—Melting Pot for tinning—$1.25

**Kwikheat Iron with choice of any one tip . . $11.00**
**Set of 5 Tips, consisting of # 0, 2, 3, 4, and 5 $5.00**




Dept. PS-3, Kwikheat Division of
**SOUND EQUIPMENT CORP., 3903 San Fernando Rd., Glendale, 4 Calif.**

# Wagemaker WOLVERINE BOATS

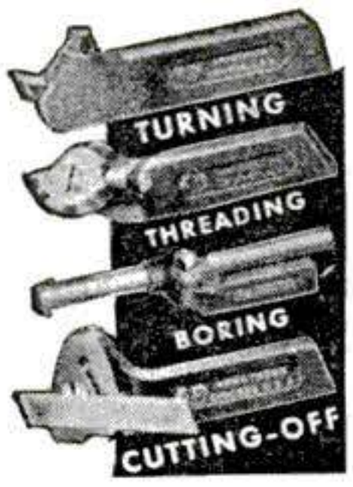
## THEY LEAD IN POPULARITY EVERWHERE

Improved Moulded Plywood Models, 14½'—240 pound DeLuxe Runabout—mahogany finished exterior and spruce interior. 12½' and 16½' Standard, deluxe and super deluxe—9' dingy—12' lightweight auto-top and 12' runabout. Many other models to choose from. Wolverine quality built boats have made thousands of friends among sportsmen and pleasure seekers. Write for our free catalog.

**WAGEMAKER COMPANY**
**Dept. 26 Grand Rapids, Mich.**

# ARMSTRONG TOOL HOLDERS

**enabled American Industry to change to war production "over night." For they are the permanent, multi-purpose tools used by 96% of the machine shops and tool rooms, on lathes, planers and shapers—the tools used to make dies and jigs, to build production machines. They are the tools you will want for your own shop—ARMSTRONG TOOL HOLDERS for industry. ACE Tool Holders for home work shops.**




**ARMSTRONG BROS. TOOL CO.**
*"The Tool Holder People"*
**328 N. Francisco Ave., Chicago 12, U. S. A.**

# GLOWS in the DARK

**MAKE BIG MONEY Selling Luminous Pictures**

Your customers will gasp with wonder at these amazing new luminous pictures, statues novelties. Be the first to sell them! Religious, nursery, glamour and other subjects. Sell on sight

WRITE FOR Free SAMPLE

**Madison Mills, 303 Fourth Ave., New York 10 N. Y.**

*Write for my catalog on*

# HAWAIIAN WIGGLERS and JITTERBUGS

**Fred Arbogast, 1705 N. St., Akron 3, Ohio**

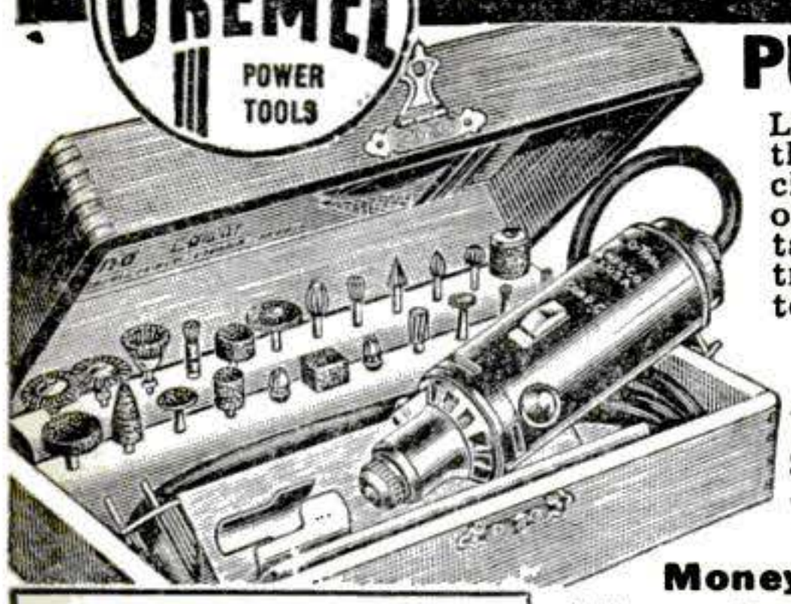
# DETECTIVES

**TRAINING—SECRET INVESTIGATIONS—FINGERPRINTS**
Easy Method — Short Time. — Rewards.
Home—Travel—Secret Code-Booklet FREE—WRITE
**INTERNATIONAL DETECTIVE SYSTEM**
**1701-P Monroe St., N. E., Washington, D. C. 18**

ELECTRIC DREMEL POWER TOOLS

# MOTO-TOOL ★ THE "POCKET-SIZE" MACHINE SHOP

## PUT THIS "WAR VETERAN" TO WORK



Long before Pearl Harbor, Dremel Moto-Tools had won their spurs by tackling tough jobs in tool rooms and machine shops. Now they have the respect of every branch of the armed forces. And thousands of them helped establish production records in plants such as General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft, Northrup, Douglas and others.

**Only Moto-Tools Have All These Features**

A Model 2 Moto-Tool develops a speed of approximately 27,000 rpm. Weighs only 13 oz. Shaped to fit the hand. Sturdily built. Has shock-proof bakelite housing. Balanced for vibrationless operation. Uses 110-120 A.C. or D.C. current.

*27,000 R.P.M.*

**A Few of the jobs That Can Be Done Better and Faster with a Moto-Tool**

- ☐ Sharpening
- ☐ Finishing
- ☐ Touching Up
- ☐ Sanding
- ☐ Drilling
- ☐ Mortising
- ☐ Engraving
- ☐ Burring
- ☐ Grinding
- ☐ Polishing
- ☐ Burnishing
- ☐ Inlaying
- ☐ Sawing
- ☐ Scoring
- ☐ Cleaning
- ☐ Routing
- ☐ Cutting
- ☐ Rasping
- ☐ Carving
- ☐ Brushing
- ☐ Dressing

**MOTO-TOOL KIT**
Kit. No. 2 with 23 high grade accessories and Model 2 Moto-Tool in hardwood case . . . $23.50 Model 2 Moto-Tool, with 1 accessory . . . . . $16.50

**Money-Back Guarantee**
**Ask your Dealer about Dremel Moto-Tools and accessories.** If he does not handle them, send direct to factory. We send prepaid if cash in full accompanies order. $2.00 brings Moto-Tool C.O.D. for balance, plus postage. Write today for FREE CATALOG.

**MOTO-SAW COMING**
**Dremel Moto-Saw . . . the sensational electric scroll saw . . . will be back as soon as materials are available.**

# DREMEL MFG. CO. Dept. 126-E Racine, Wisconsin



Copyrighted material

# Goodbye Putty

TREMCO

## MASTIC-GLAZE IN COLORS

REG. U.S. PAT. OFF.

*Successor to putty!*

- NEVER CRACKS
- NEVER FALLS OUT
- EASIER TO USE
- NEEDS NO PAINTING

At dealers everywhere

UG 1211

**TREMCO QUALITY PRODUCTS**
FOR HOMES AND FARMS



## 5 SECRETS . . . OF WINNING GOLF

**Easy to Learn "Dynamic Swing" Every Pro Uses**

PLAY IN THE 70'S. Enjoy your game. Amaze your friends. Get out of the "dub" class by using golf's most powerful and accurate swing. **Five basic secrets** give you rhythm and power, eliminate hook and slice . . . make you MASTER OF EVERY CLUB. Easy to make long drives and beautiful approach shots. Learn in a few days—10 minutes' practice a day. COMPLETE COURSE NOW ONLY **$1.00** postpaid, or $1.00 plus 24c for postage and C.O.D. fee. Your money back if you're not amazed with results, so order NOW!

**THE SYLVAN COMPANY** 125 Seventh Ave., Dept. U, LaGrange, Ill.



**PEPSI-COLA HITS THE SPOT**



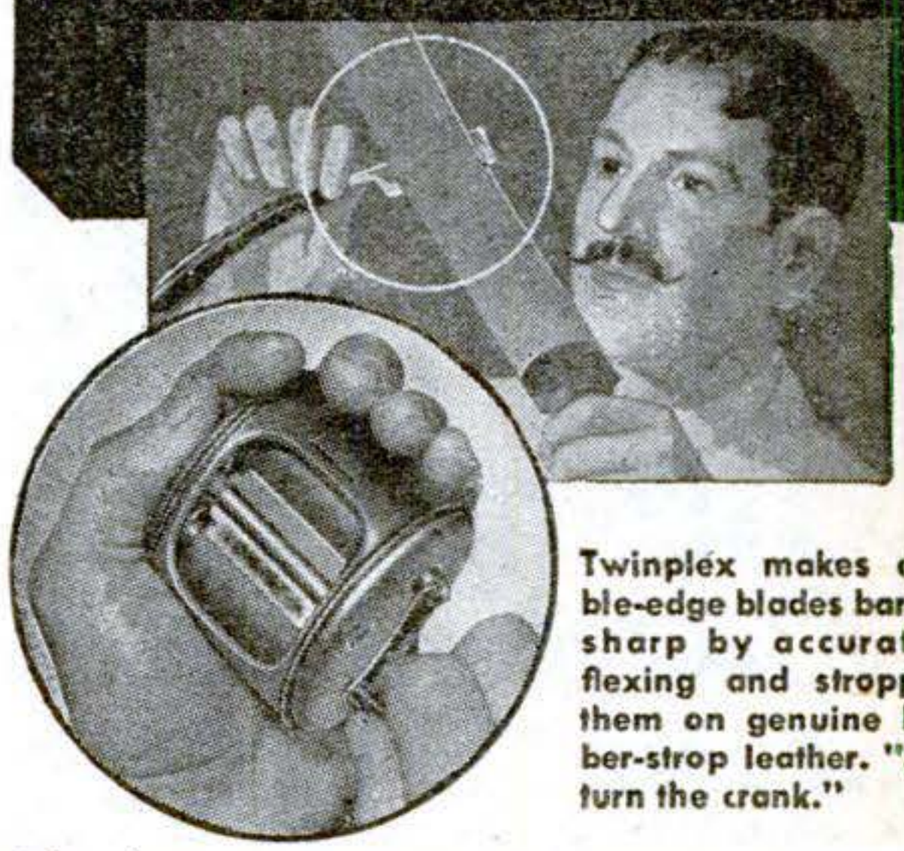
## THE INFERIORITY COMPLEX

has its roots in unreasonable fear and results in bashfulness, lack of self-confidence, nervousness, mental conflicts, etc. Amazing psychology course points the way to Self-mastery and a Magnetic, Success-winning Personality. Sent postpaid for only $1.00 (no C.O.D.'s or cheques). Money back if not satisfied. Free literature on request.
**DR. G. MALCOLM SMITH, Dept. 104, 1104 Union Ave., Montreal 3, Can.**



## THE TRUTH ABOUT SHAVING

**Just turn the crank**
**Smart shavers say . . .**
**To SHARPEN blades**
**The Barber's Way!**



Twinplex makes double-edge blades barber-sharp by accurately flexing and stropping them on genuine barber-strop leather. "Just turn the crank."

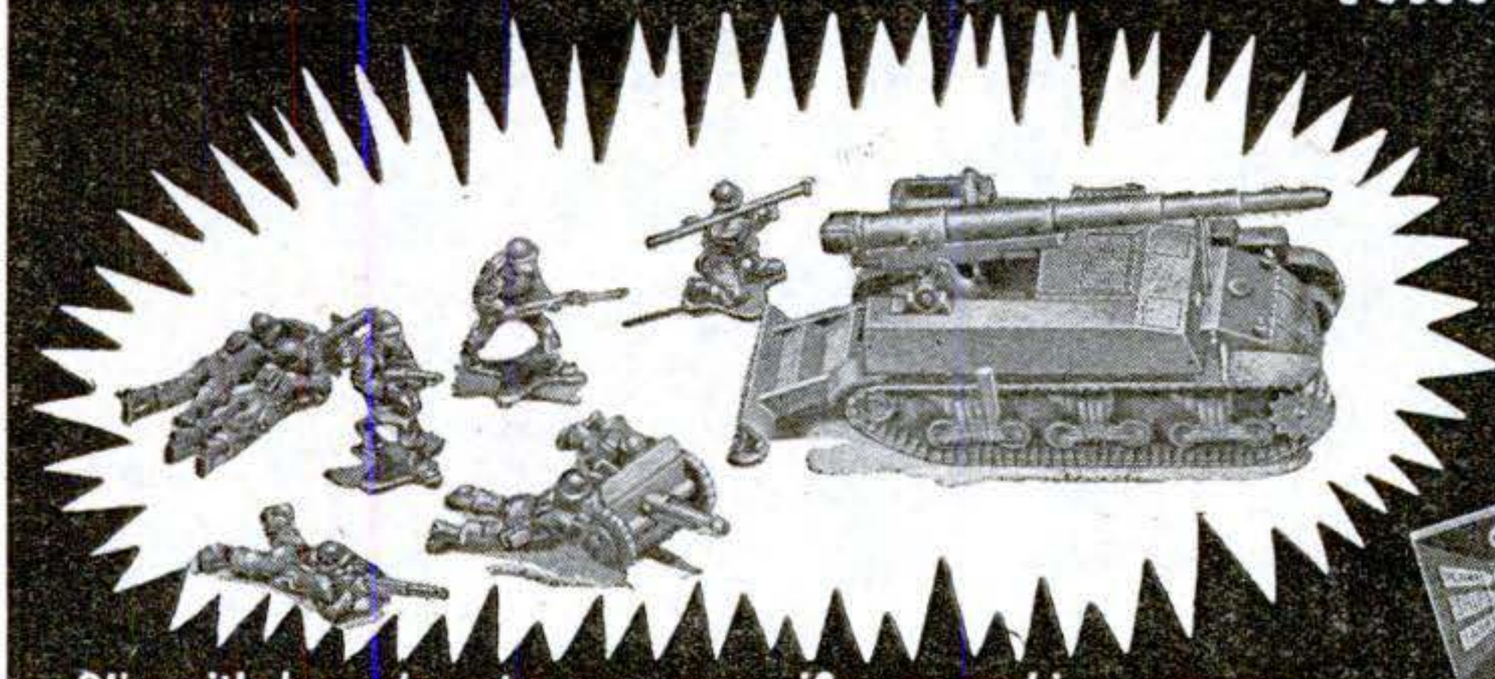
The famous Twinplex Stropper will keep a *keen cutting edge on your blades* by mechanically *stropping both sides* like the barber manually strops his "straight-edge." MEN . . . it's *not* the *brand* of beard softener or blade that *cuts* whiskers off . . . it's the blade edge . . . *and that's the truth!* So keep that edge super-sharp. Use Twinplex for easy, quick, smooth, *perfect* shaves. Only $2. *Ideal for gifts.* Ask your dealer for a *demonstration* today.

TWINPLEX MANUFACTURING CO., CHICAGO

OWNERS BRAG ABOUT
**Twinplex**
BLADE STROPPER
USED BY MILLIONS SINCE 1915



## Authenticast SCALE MODELS OF TANKS AND SOLDIERS!



**PERFECTLY CAST—ALL METAL**

AUTHENTICAST scale models are scoring a direct hit with hobbyists everywhere! Ask your hobby dealer to show you the complete AUTHENTICAST collection of tanks, jeeps, scout cars, half tracks and soldiers. Tanks $1.10 to $2; Men $1.85 box of 12 asst'd. Scaled to match, 1 in. to 9 ft. Send 35c in coin for 32-page color catalog.

Authenticast
COMET METAL PRODUCTS CO. INC.
91-12 132nd St., Richmond Hill 18, N. Y.

*GI's with bazookas, tommy guns, rifles — machine gunners, anti-tank crews behind the famous M12 — 155mm "Long Tom"*





Copyrighted material

HERE'S THE TRICK FOR GOOD PAINTING

10¢ SIZE At paint, hardware, department and 5 & 10¢ stores.

# DIC·A·DOO
## *Paint Brush Bath*

Good painting starts with a good brush. To *keep* a brush good, use Dic-A-Doo Brush Bath. It keeps spring in the brush, life in each bristle. Paint flows smooth and easy, no matter how old the brush.

**Reclaims Old Brushes.** Brush Bath restores old paint-hardened brushes. Every bristle comes clean, right down to the hilt. New brushes give extra mileage.

**Works Fast But Gently.** This amazing brush cleaner does its work fast but safely. It *cannot* harm or loosen bristles. Be safe. Use the cleaner painters use. (Recommended for nylon brushes, too.)

**FOR A SURFACE LIKE NEW *just* DIC·A·DOO**

Use Dic-A-Doo Cleaner for any painted surface — walls or woodwork — inside or out. Put it on — wipe it off. It *lifts* dirt out. Safe for the surface—good for your hands.

PATENT CEREALS COMPANY, GENEVA, N. Y.

---

# JACKASS
## CIGARETTE DISPENSER

*Something New!*
1000 LAUGHS
NOVELTY SENSATION

Lots of fun for you and your friends. By pressing the head downward the jackass will extend a cigarette for your guests. Movable head and tail, design shows Mexican wearing large hat and shawl sitting on the jackass. Silk screen picture. Four flashy colors bring out every detail. A swell gift for anyone. Order now. Be the first to own one. Send cash or money order when ordering; you save postage and C.O.D. fee. Sent C.O.D. plus charge. PRICE $2.00.

**SPECIAL OFFER TWO FOR $3.50**
$16.80 a doz. Special price in larger quantities.
**SPECIAL CIGARETTE LIGHTER, $1.00**
*Only One Sold With Each "JACKASS CIGARETTE DISPENSER"*
**FARLEY SINEATH**
*Manufacturing Novelties*
800 Eighth Avenue, Department New York 19, N. Y.

---

# YOU CAN'T WORM WRONG

for tape, hook, whip, round (ascarid) worms when you worm your dog as directed with Pulvex Worm Capsules, a combination treatment which insures your worming right. Used by leading breeders. Packaged 2 ways: for puppies, for dogs. Either, 50¢; double-size, 75¢ At pet, drug, department stores.

**PULVEX**
★ COMBINATION TREATMENT
**WORM CAPSULES**

---

# SELL FAMOUS SUNSHINE "EVERYDAY" CARDS

Take orders galore from friends, neighbors, relatives for entirely new creation "SUNSHINE NOTES." 21 FRENCH FOLDERS with tricky, appealing, beautifully colored designs for $1. Costs you as low as 50c per box. No greeting inside. Used for all occasions. No waste. Also complete line of New BEADED EVERYDAY BOXES, BIRTHDAYS, CONVALESCENT, EVERYDAY GIFT WRAPS. Be the first in your community to show this fast-selling new box. Send for complete catalog and sample on approval now.

**SUNSHINE ART STUDIOS, 115 FULTON ST., Dept. N5, NEW YORK 8, N. Y.**

**EARN MONEY EASILY**

---

# CODE SPEED
**SHORT CUT**

Be an expert. Learn to be a Telegraph or Radio Operator. Thousands of men needed. Intensely interesting work—good pay. Learn at home or wherever you are, quickly, easily with the famous Candler Speed System. Book of particulars Free.
**CANDLER SYSTEM CO., Dept. 6-E, Box 928, Denver 1, Colo. U.S.A.**

---

*Class Pins and Rings*

Artistic pins, rings and emblems. Finest quality. Reasonable prices from 30c up. Write today. Dept. O, Metal Arts Co., Rochester, N. Y.

★ FREE Catalog

---

# WATCHES WANTED
**BROKEN OR USABLE**

—all kinds, even Ingersolls. Highest prices paid for jewelry, rings, spectacles, gold teeth, etc. Cash mailed promptly. Write for Free Shipping Container.
**Lowe's, Holland Bldg., Dept. PS, St. Louis 1, Mo.**

---

# Now She Shops "Cash And Carry"
## Without Painful Backache

Many sufferers relieve nagging backache quickly, once they discover that the real cause of their trouble may be tired kidneys.

The kidneys are Nature's chief way of taking the excess acids and waste out of the blood. They help most people pass about 3 pints a day.

When disorder of kidney function permits poisonous matter to remain in your blood, it may cause nagging backache, rheumatic pains, leg pains, loss of pep and energy, getting up nights, swelling, puffiness under the eyes, headaches and dizziness.

Don't wait! Ask your druggist for Doan's Pills, a stimulant diuretic, used successfully by millions for over 40 years. Doan's give happy relief and will help the 15 miles of kidney tubes flush out poisonous waste from your blood. Get Doan's Pills.

Copyrighted material

**NOW AVAILABLE! Sturdy, handsome, reliable, a watch for every occasion—backed by the famous BELL guarantee.**

Anti-magnetic, radium dial and hands, unbreakable crystal, sweep second hand, precision tested.

No. CD 197
17 jewels, stainless steel back..... **$29.75**

No. CD 188
17 jewels, all stainless steel case..... **$47.50**

No. CD 328 SELF-WINDING
17 jewels, all stainless steel case..... **$59.75**

**ORDER BY MAIL:** Send check, money order, or pay postman C.O.D. Prices Incl. Fed. Tax & Postage. Gift Box

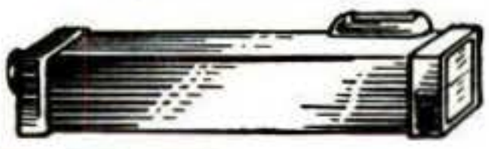
Wide choice of fine watches for men and women.

Write for FREE Illustrated Booklet "CD"

**BELL WATCH COMPANY**
Time and Life Bldg., Rockefeller Center, New York 20, N. Y.

**HUNTER'S COMPASS**
Hunting Case, Watch Type, All Metal, Jeweled **$3.50**

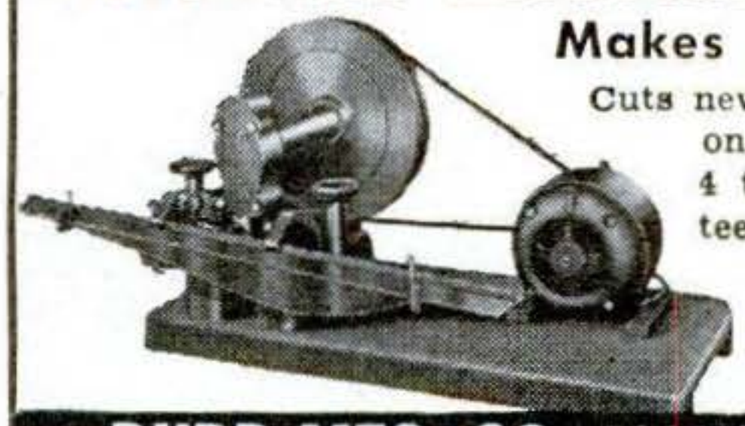
***Engineers All Metal Army Type Hand-Sighting***
**LEVELS**
**$1.50**



**PUBLIC SPORT SHOPS**
13 S. 16th St., Phila. 2, Pa. No COD's

***Today* .... ELECTROPLATING**
The business of tomorrow. Learn this interesting, profitable business. Hobby or full time. Postcard brings full details, FREE. PLATER HYDE, Dept. S, P. O. Box 176, National City, Calif.

**AUTOMATIC RETOOTHER** FOR HAND SAWS



Makes New Profits

Cuts new teeth in 50 seconds! Any size tooth 4 to 16 points. Old teeth fall off as chips. Simple to operate. A perfect job.

**BURR MFG. CO.** 8931 Venice Blvd., Los Angeles 34, Calif.

**FOR *TROUBLE-FREE* GRINDING . . in your Home Workshop**

Smooth operating and sturdy, the No. 155 Millers Falls grinding head will give years of perfect service in your home workshop.

Here are a few of its many features: designed to drive from above, behind, or below . . . has "Oilite" bronze bearings, a ¾-inch spindle, and carries two wheels up to seven inches in diameter, a ⅜-inch capacity chuck and a taper thread spindle . . . bearings are lubricated through good-sized spring top-oilers.

A complete line of heads is offered by Millers Falls to meet every grinding and polishing need. All are rugged, modern in design, and of advanced construction. All will make your work easier and quicker. See them at your dealers today.

***One thing in common — Quality!***

MILLERS FALLS TOOLS SINCE 1868

**MILLERS FALLS COMPANY**
**GREENFIELD, MASSACHUSETTS**




Copyrighted material

# SWIVEL-HEAD FLASHLIGHT

*nothing else like it!*

**HEAD TURNS LIGHT AT ANY ANGLE**

Greatest advance in flashlight design in a generation. *Turn powerful pre-focused beam where you want it . . .* stand it up . . . clip it on . . . both hands are free. A handsome, durable, all-purpose flashlight for everyone. Ask your dealer.

**$2 LESS BATTERIES**

No. SW-22 Patented

No. 75 Heavy-Duty Dated Cell. Fresh—Lasts longer. 10¢

## Flashlights & Batteries

If dealer cannot supply, send $2.00 to Dept. O

**UNITED STATES ELECTRIC MFG. CORP., New York 11, N. Y.**

*USALITE *Red-Head* Safety Flashlight—a "MUST" for the motorist.

# PLASTICS

**There's fun and profit in making plastic jewelry, novelties, and furnishings, in your home workshop! We have every material you need — Plexiglas, Lucite, Bakelite, Lignolite, Tenite II, Lumarith, in a large variety of sheets, rods, tubes, and special shapes. Also dyes, cements and other plastics supplies and accessories. Send 10 cents today for complete catalog.**

**CARMEN-BRONSON CO.**
**165 East 3rd St., Dept. 5-A, Mt. Vernon, N. Y.**

# YOUR ELECTRIC DRILL HAS *100 Other Uses*

when used with K-Jax attachments

**Metal Sawing . . . Shearing**
**Riveting attachments**

Write for illustrated circular

**K-JAX, Dept. P.S. 4, P.O. Box 3044, Dallas, Texas**

**NEW! *Ideal Gift for Your Service Man!***

Heavy 10K Solid Gold Souvenir Service Ring of World War II. A beautiful and authentic ring that your service man will be proud to wear and cherish forever. It plainly shows that he is a Veteran of our Armed Forces of World War II. Available in all sizes. We pay postage and Fed. Tax.

**No. 1214 Sterling Silver . . . $6.00**
**10K Solid Gold . . . . . 18.00**
**Send for Circular of Service Jewelry.**

**EDWIN W. LANE CO., Dept. PS, 32 W. Randolph St., Chicago 1,**

# LAW

**STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 37 years expert instruction —over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy payments. Send for FREE BOOK—"Law and Executive Guidance"**

**AMERICAN EXTENSION SCHOOL OF LAW**
**Dept. 65-S, 646 N. Michigan Ave., Chicago 11, Ill.**

# SWISS MADE WATCHES

**Wear 10 Days at Our Risk!**

Swiss made watches are renowned for accurate timekeeping. This men's watch has a sturdy, finely-constructed chrome case, an open figure dial, genuine leather strap. SEND NO MONEY! Just pay postman for wristwatch $8.50 plus few cents postage and 10% Federal excise tax. Wear for 10 days on our money-back if not satisfied guarantee! Rush orders today —supply is limited. **UNITED PRODUCTS CO., 7941 S. Halsted, Dept. MM-205, Chicago 20, Ill.**

*6 handy tools in ONE!*

1 MITERING GUIDE
2 DIAMETER GAGE
3 ACCURATE SQUARE
4 MARKING GAGE
5 CENTER FINDER
6 CONVENIENT RULER

**$1.50 POSTPAID**

# MITER-MASTER

Miter Master takes the place of an expensive miter box accurately set to any angle. Scale marked for mitering 5, 6, and 8-sided frames. Steel construction. Built to last a lifetime. If your dealer can't supply you we will send it postpaid anywhere in the U. S. for $1.50. (Foreign $1.75). Unconditional guarantee. If not satisfied within ten days for any reason whatsoever, your money will be refunded.

**MASTER SPECIALTY COMPANY**
**3024 EAST LAKE STREET • MINNEAPOLIS 6, MINN.**



Copyrighted material

# "A Six Room House, $2800 Complete, Ready for You to Move In"

**BY GEORGE W. PEARCE**

The author, a mechanical engineer, reviews the history of housing and shows how building costs have risen in the last 150 years until few families can buy a house adequate for their needs.

He then describes how, by the use of various money-saving building methods, a large, modern, 6-room, thoroughly insulated, fire resistant, 2-bath bungalow with garage can be had most anywhere in the United States for $2800.00.

Included with the book are 10 folded drawings, 12" wide x 18" long. These drawings by Mr. Pearce show all the details of construction for this house—the wiring, the plumbing, the automatic oil heating system and the fluorescent lighting. The book is devoted to showing how similar savings can be made on any house of any style, size or floor plan.

A very readable and interesting book. Every prospective home owner should have a copy. 138 6" x 9" pages, 26 illustrations, leatherette bound. 10 large drawings.

Send $2.00 to TECHNICAL PRESS, Box 6 D, Swampscott, Mass., and your copy will be rushed to you postpaid. Distributed solely by Technical Press—Not sold in book stores.

# *King of* ELECTRIC SWITCHES

***Versatile Switch of a Thousand Uses***
***Millions in Post War Applications***

Floodlights your porch when the door is opened—sounds alarm when window is opened—signals arrival of mail—controls heating of furnace—filling of water tank, these and many other services are performed by this versatile switch. Shipped with instruction sheet showing numerous illustrated uses for this device at the low price of $1.00 postpaid.

**KING PRODUCTS COMPANY** **BATAVIA 1, ILLINOIS**

# LENSES *500,000 OF THEM!!*

Buy them for a fraction of their original cost, U.S. Army and Navy surplus lenses and prisms.

| | | |
|---|---|---|
| **RIGHT ANGLE PRISM** 40 m/m sq. face | ea. | **$ 1.75** |
| **ACHRO. OBJ.** 32 m/m Dia. 130 m/m F.L. cemented | ea. | **1.50** |
| **ACHROMATIC BINOCULAR OBJECTIVE** 53 m/m Dia. 174 m/m F.L. coated and cemented. Perfect | ea. | **3.75** |
| **5X TANK TELESCOPE** (M71) Brand New assembled | ea. | **22.50** |
| **METAL PARTS** only to make a complete 5X Tank Artillery Scope. Diagram included | ea. | **7.50** |

Send Money Order or Check—3 cent stamp for list.

**A. JAEGERS** **BOX-84B** **SO. OZONE PARK 20, N. Y.**

**Combination Siphon and Bottle Stopper For Parties, Camping, Home, Barbecues**

**Serv-Rite Mixer Dispenser**

**$1.00** Post-paid

Fits any standard bottle. Retains carbonation. No need to remove bottle cap.

Sensational pocket-size mixer dispenser that fits any standard carbonated water bottle . . . ideal for highballs, ice-cream sodas, etc. Simply hook Serv-Rite clamp under bottle cap. Push plunger down hard to pierce bottle top. Shake bottle gently to generate carbonation: then invert bottle and contents are expelled with force comparable to a soda fountain or bar dispenser.

Write today enclosing remittance.

**Hollywood Home Accessories, Inc. 1235 West Sixth St., Dept. PS-5, Los Angeles 14, Calif.**

# EARN BIG MONEY

## MAKING DIES
### in your own home workshop

**HOME SHOP WORKERS**

*Here's what you've been waiting for!*

The FIRST Really Low Cost

## *Drill Press* FILING ATTACHMENT

**FOR FILING, JIG SAWING, SLOTTING NIBBLING, CUTTING KEYWAYS**

This amazingly simple invention can be readily adjusted to fit all standard makes of home shop drill presses. Made of the finest materials by a precision manufacturer, it costs you only $18.50 prepaid, a small fraction of the price asked for other more complicated types. But production is limited. Order direct today for immediate delivery. Satisfaction guaranteed or your money refunded. Please state type of drill press used in your shop.

DEALERS AND JOBBERS WANTED

ORDER DIRECT TODAY

J B Products Co.
109 S. Beachwood Dr.
BURBANK
CALIFORNIA



Copyrighted material

# A HOME OF YOUR OWN.. WHERE YOU WANT IT!

**BUY SCHULT GET ALL 4**

**COMFORT**
Cross ventilation; full insulation; built-in bed *plus* sofa bed; well-lighted vanity with lavatory.

**CONVENIENCE**
"A place for everything" in this mobile *home* designed for efficient living.

**BEAUTY**
Fabrics that harmonize with the beauty of rich interior woodwork.

**QUALITY**
Designed by the pioneers of the industry. Built by latest methods, painstakingly, of selected materials.

● This mobile home has every facility of a modern house. Follow the job—or the fishing—in true comfort.

**COMPLETELY FURNISHED**
Built-in furniture; complete kitchen with oven range; davenport in living room converts into an *extra* double bed. Sliding doors provide 3-room privacy!

For *plus-value* in mobile homes see your Schult dealer, or write for new catalog of 1946 models.

SCHULT CORPORATION, Dept. 3105 ELKHART, INDIANA.
*Member:* TCMA

# SCHULT TRAILER COACHES

# This is the way to Make Money!

**MACHINE SAW FILING** with the Foley Automatic Saw filer is the modern way to recondition saws. Anyone can do the work—no experience needed—no eye-strain. Start in spare time—Foley-filed saws cut so smooth and fast, they will advertise for you, bring you new customers and a steady repeat cash business.

The Foley is the ONLY machine that files all hand saws, also band and cross-cut circular saws,—enables you to handle work from schools, shops and factories as well as farmers, carpenters, etc.

**Send for FREE PLAN**
Shows how to start—no canvassing. Send coupon today.

"I bought a Foley Saw Filer, one year later had all debts paid and also $400 on a new home. Many days I earn as much as $16," says *J. H Kellogg*

*W. L. Tarrant writes:* "I left my old job last September and in 10 months have filed 2,159 saws. We have a lovely business worked up and cannot keep up with the work."

*Thor Nedrbe, Iowa, says:* "I have filed 550 saws, made $350. As I'm a carpenter, I just file saws in spare time—have more than I can take care of."

ARMY E NAVY

**FOLEY *Automatic* SAW FILER**

**FOLEY MANUFACTURING CO.**
519-6 Foley Bldg., Minneapolis 13, Minnesota
Send Free Plan on Saw Filing business, no obligation

*Name* _____

*Address* _____

# V-8 DUALS AND SINGLES

**A genuine steel pack muffler WITH A BEAUTIFUL MOTORBOAT TONE. Sandee Mufflers feature improvements far in the lead, years ahead of competition. Increases mileage and power, reduces back pressure and gives better performance. Savings in gasoline will pay for a Sandee Muffler.**

**V-8 FORD AND MERCURY DUALS $17.50**

**SINGLES—FIT IN PLACE OF REGULAR MUFFLER**
**Chev., V-8 Ford, Plym., $5.00 Chrys., Olds., Buick, etc., $7.00**
**These mufflers will outlast two regular stock replacements.**

*Dealers Wanted*

**SANDEE MUFFLER CO.**
7523 S. WESTERN AVE., LOS ANGELES 44, CALIF.

**FREE!** FAMOUS BLUE BOOK CATALOG

**GAME SUPPLIES**
Club Furniture - Counter Games - Punchboards - Magic Cards Readers, Read the backs - Inks - Daubs - Poker Chips - Tops Flats - Layouts - Game Boxes.

**K. C. CARD CO.**
838 South Wabash Ave., Chicago 3, Ill.

# 1 New - Improved OIL FOR ALL ---

**HOUSEHOLD-SPORTSMAN-MECHANIC**
*Lubricates - Prevents Rust - Cleans Metal*

3 oz. 40c

# FIENDOIL

# NEW CHEAP OIL BURNER

**FOR COOKING & HEATING STOVES-FURNACES**
**HEAT YOUR HOME, COOK YOUR MEALS WITH CHEAP FURNACE OIL**

**NO MORE SHOVELING COAL OR ASHES.** New Fuelizer Starter Vaporizing System turns Cheap 130 Flash Furnace Oil into Oil Gas heat without clogging up. LIFE-TIME GUARANTEE against defects. $1.00-BONUS OFFER FOR TESTING. We will let you try it in your own stove or furnace for one month. Get Yours for introducing. Big profits.

**Be first. Send in your name today.**
**NORTHWEST MFG. CO., 562-E 5th Ave., Mitchell, So. Dak.**

# If Ruptured

*Do What Others Now Do—*
**Wear a Form Fitting MILLER Truss**

which provides natural freedom and comfort in working, walking, playing, horse back riding, dancing, swimming or sleeping. You just cannot afford to be without this protection and convenience.

**Wear two weeks** then consult your physician before deciding to keep it.

Write me today for **FREE** descriptive circular. Sent in plain, sealed envelope.

**FRED B. MILLER Manufacturer**
**Dept. P.S. Hagerstown, Maryland.**



Copyrighted material

## A New Hobby!

## COLLECT GENUINE U. S. MILITARY SHOULDER PATCHES

Make your den or lodge room the center of attraction with this fascinating hobby! Over 300 authentic military shoulder patches in stock, from 15c to 50c each! Send only 10c in coin for illustrated folder and price list.

**MIDWEST SALES CO.**
Dept. PS-17
P.O. Box 1092 Omaha, Nebr.

Made From
## IMPORTED BRIAR

- Sweet Smoking
- Superior Grains
- Modern Designs
- From $3.50 to $10

**The Author** SEND FOR FREE ILLUSTRATED BOOKLET

C. B. WEBER & CO. 146 Cator Ave., Jersey City 5, N. J.

Pat. Pend.

## LOCATES TROUBLE INSTANTLY IN ALL ELECTRICAL DEVICES

**HANLAN APPLIANCE TESTER**

In this single unit are combined all the necessary tests for examining every appliance. Checks thermostats under actual working conditions. Tells instant it opens or closes. Controls the heat on soldering irons. Prevents over-heating. Tests continuity, open circuits, etc. Checks automatic irons, vacuum cleaners, motors, shavers, bulbs, appliances with 3-way switches, etc. Great time effort and money saver! ONLY $9.50 COMPLETE.

**FREE** with each Tester. New, Complete Practical Course in electrical appliance repairing. WRITE FOR CIRCULAR.

**HANLAN CO., 1419-B, West Jefferson, Los Angeles 7, Calif.**

## METALLIZE BABY SHOES

Learn this easy, money making business from nationally recognized consultant. Small investment; perpetual market. For free details write Joseph B. Kushner, B.S. Ch.E., Metal Finishing Consultant, Stroudsburg, Pennsylvania, R.D. 3F.

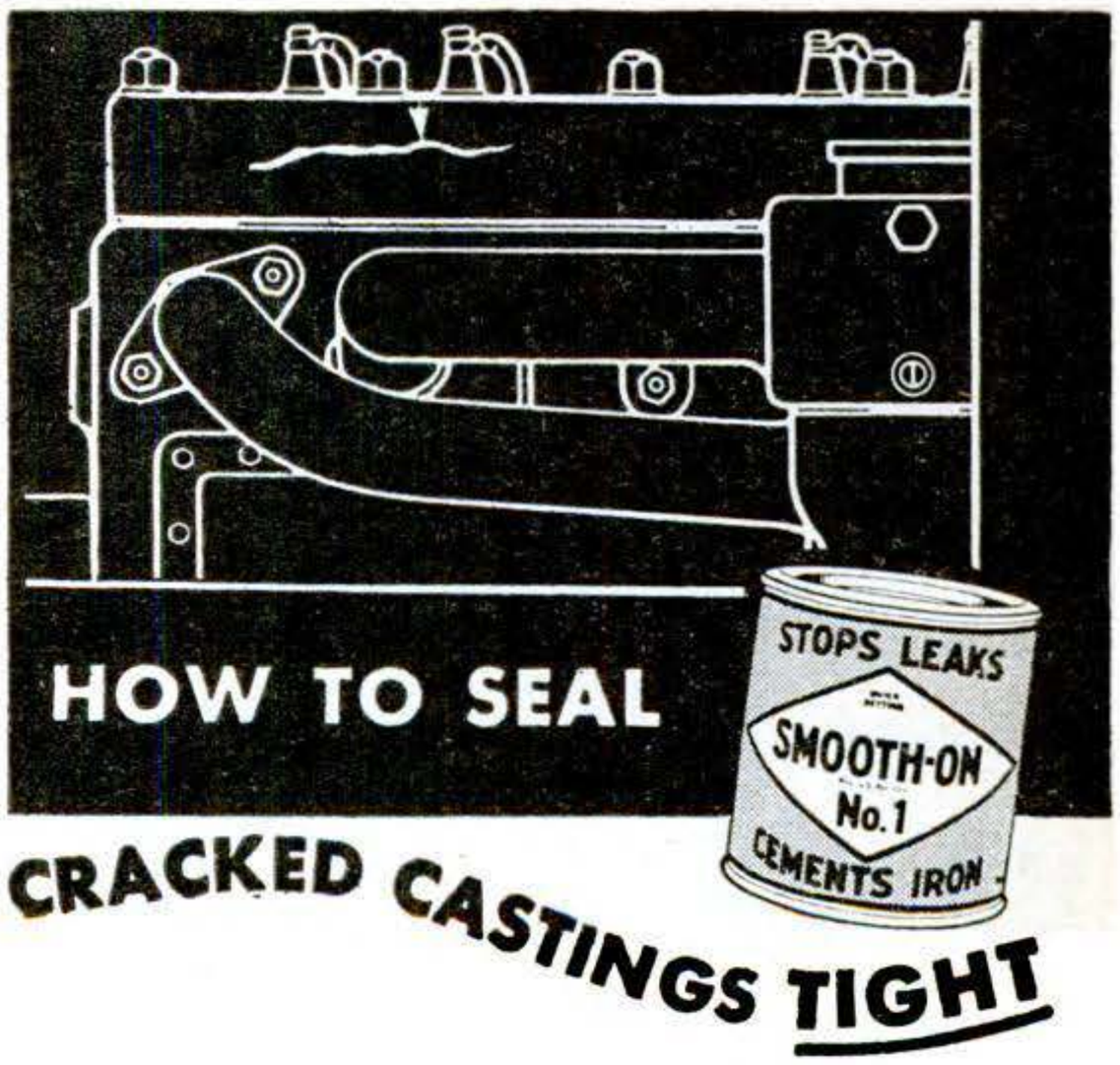
## Cabin PLAN BOOK-$2.00

**HEALTH and FUN for YOU, whether in Sunny California or Rugged Maine**

- A multitude of ideas for practical, low-cost cabins and cottages. Pictures and floor plans. Suggestions for fireplaces, barbecue pits, built-in furniture. Plans for row-boats, docks and floats.
- Complete drawings and lumber lists for a build-your-own $500 cabin or $2500 2-bedroom cottage.

**BUILD-YOUR-OWN** for next season's healthful fun, now! Send check or money order for $2.00, today.
*Copyrighted '45 W-P-Co.*

**WOODBECK PUBLISHING COMPANY**
GRAND RAPIDS • • MICHIGAN



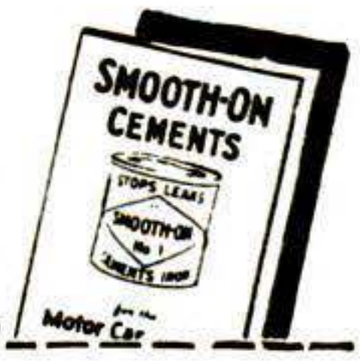

## HOW TO SEAL CRACKED CASTINGS TIGHT

Cracks in cast iron boilers, firepots, auto crank cases, gear cases, water jackets, etc. are lastingly sealed with Smooth-On No. 1 at very low cost. Even cracks that are long, or on parts subject to pressure, can be effectively sealed with this time-tested iron repair cement.

You use Smooth-On like putty, no heat needed. It hardens like metal and holds tight because it expands a little as it sets. You'll be surprised at the effectiveness of the repairs you can make with Smooth-On No. 1. Sold in 1¾-oz., 7-oz. and larger sizes at hardware dealers. If your dealer hasn't it write us.

**FREE** 40-PAGE REPAIR HANDBOOK

**Clear, simple instructions for innumerable practical metal repairs. 170 diagrams. Pocket size. Just send coupon.**




*Sign and Mail NOW*

**Smooth-On Mfg. Co., Dept. 58**
570 Communipaw Ave., Jersey City 4, N. J.
**Please send me a Smooth-On Handbook.**

Name.....

Address.....

.....

## Do it with SMOOTH-ON

**The Iron Repair Cement of 1000 Uses**




Copyrighted material

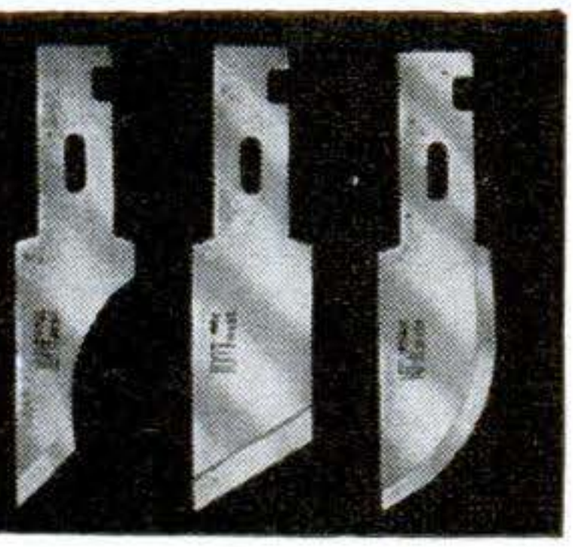
# "1001" Re-Blade Knife*

*with interchangeable surgical steel blades!*

**KEEN! EVER SHARP! EVER READY!**

"1001" Knife as above, $1.29

Knife with 3 extra, different blades and honing stone, $1.59



## The first really "balanced" craft knife

Whether you're an expert craftsman or just a passably fair workman or hobbyist, you'll do better work faster and easier with "1001"—the re-blade knife of 1001 uses! For "1001", thanks to its light, perfectly balanced, colorful plastic handle, is second to none for easy and exact whittling, chiseling, modeling and cutting of all sorts. *Its patented, scientifically designed chromium finish blade holder simplifies the insertion and removal of "1001's" all-purpose blades, and keeps them firmly locked in place.* Yourself—get a "1001"—*feel* the difference, *see* the difference in your work. It's as easy to handle as a pen or pencil.

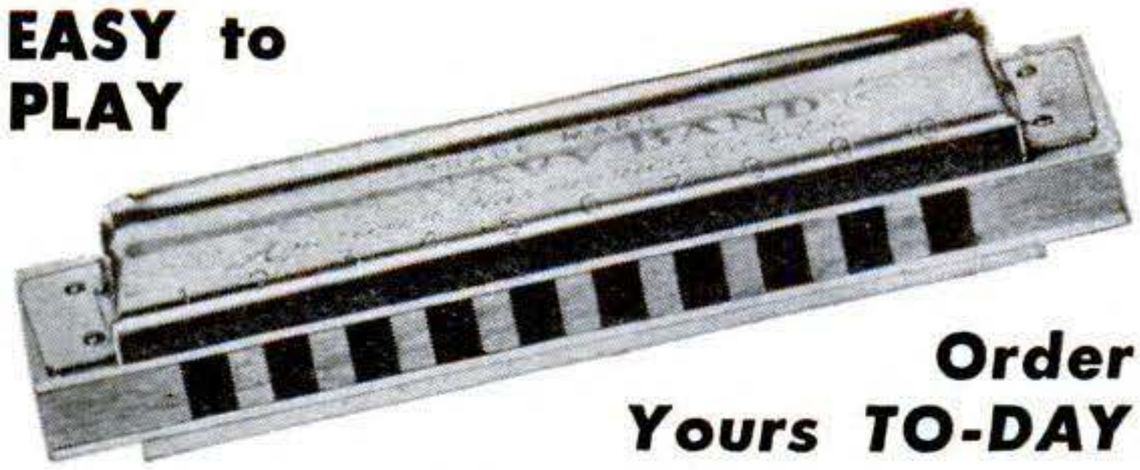
- ***Buy "1001" wherever hobbycraft tools are sold. If your dealer cannot supply you, send check or money order for $1.29 (or $1.59) direct to***

**SOMAR SPECIALTY CORP.**
**Dept. M11—630 Fifth Ave., New York 20, N. Y.**

*PAT. PENDING

---

**EASY to PLAY**



**Order Yours TO-DAY**

## *The New Luellen* HARMONICA

Most wonderful pocket instrument ever made is the harmonica. Easy to master, fun for Everyone. The Luellen has 10 holes, 20 notes. Key of C. Beautiful tone. Now ready. Postpaid Only **$2.10**

**INSTRUCTION BOOK.** Simple for youngest child. No notes, scales nor exercises. Ten lesson charts show everything. Includes 75 popular songs. Price **$1.00.** Here's our special introductory offer: The Instructor and the Harmonica, both postpaid, both for **$2.69.** Send Check or Money Order Today.

**JOHN LUELLEN & CO., 17034 Page Avenue, Dept. 504, Hazelcrest, Ill.**

---

## POCKET WATCHES

### *SWISS MOVEMENTS*

Now available "EXPERT" watches. Swiss made watches are known the world over for their accurate timekeeping and quality construction because they are made by master watch craftsmen. This handsome men's pocket watch has a sturdily-constructed chrome case and open figure dial. A timepiece you will be proud to own. SEND NO MONEY. Simply pay postman $8.50 plus 10% tax and postage. Wear 10 days on our money back if not satisfied guarantee.

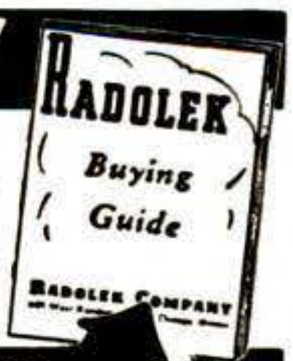
**UNITED PRODUCTS CO.**
**7941 S. Halsted, Dept. P-315, Chicago 20, Ill.**

---

## *Everything in Radio!*

Make **Radolek** your buying headquarters for Radio-Electronic repair and replacement needs. Large stocks assure finest, most complete selections of all available items at lowest prices. Your orders receive special attention for fastest delivery. Send today for FREE **Radolek Buying Guide.**

**RADOLEK CO., Dept. A-114, 601 W. Randolph St., Chicago 6, Ill.**




**FREE RADIO BUYING GUIDE**

---

## NEW OTTAWA Wood Saw

**FOR TRACTORS** Makes wood sawing fast; easy. Cuts enough wood to pay for itself quickly. Easily moved while attached. Big blade; send for FREE details.

**OTTAWA MFG. CO., W-501 Oak Ave., Ottawa, Kans.**

---

**59c**

5 Extra Blades (Year's Supply) 25c

## COMB-A-TRIM

### THE NEW QUICK TRIMMER

Something New! Trim your hair without any experience. It's easy! The excess hair comes off smoothly and easily by just pulling trimmer through hair like an ordinary comb. Also removes hair from legs—armpits. Save on hair-cut bills . . . Trim your own hair or the whole family's. Send 59c and your Comb-A-Trim will be sent at once.

SPECIAL OFFER
Send $1.00 for 2 Comb-A-Trims and save 18c. **2 for $1**

**COMB-A-TRIM CO.**
**1734 Carew Tower Dept. J-6 Cincinnati, O.**



Copyrighted material

# HOME INDUSTRY OPPORTUNITIES

**Make Good Door Mats from Old Tires** with simple homemade cutting and hole punching equipment powered with a 1/4 HP motor. Illustrated instructions, 50c.
**Profitable Toy Making.** From scrap wood, paper, metal, rubber, linoleum, cloth, plaster, etc., 25c.
**Liquid Rubber from Old Tires.** Make molds, door mats and rubber articles. Ten formulas and processes, 50c.
**How to Make 30 Useful Articles of Wire and Sheet Metal** with homemade jigs. Illustrated, 50c.
**Rubber Mold Making.** Marbleizing, glazing, flock, etc., 25c.
**Security in a Small Farm.** Twenty ways described, 25c.
**10 Local Business Plans** net up to $200 a month, 25c.
**Collection of 100 Selected Formulas,** 25c.

**All 8 of the Above List of Booklets and Formulas, $2.00. No C.O.D.**

## BUILDING CONSTRUCTION

with cement composition and cheap wood builds 3 room house low as $250. Farm building low as $50. Homemade forms make blocks, panels and tiles in color, and wallboard of sawdust and other compositions. Wall-high blocks, insulated, with finished sides. Stream-lined roof and walls. Cement gutters. Cabins, stores, sectional. Troweled roofs and floors. Ten formulas, 100 money and labor saving ideas. Mixer and buzz saw easily made from an old auto. Make doors and windows. 50 proved ways to earn $10.00 $15.00 a day. Guaranteed, illustrated book, $1.00.

**MAKE FURNITURE OF COMPOSITION** cement, sawdust, paper, asbestos. Homemade cement. Some part scrap wood, and metal make tables, cabinets, chests, racks, shelves, inclosed sinks, lawn novelties and toys. Over 500% profit. 50c.

**HOW TO MAKE ACCURATE SHOP MACHINES,** saws, drills, forge lathes, tools, electric weed cutters and many other things from old auto parts and washing machine motors. Illustrated, 50c.

**HOME MFG. ENTERPRISES.** 50 selected home shop projects, 50c.

**Special: All four booklets described above, $2.00 postpaid. No C.O.D.**

**HOME INDUSTRIES, 1318 So. 30th Ave., Dept. PS., Omaha 5, Nebr.**

# GRAB BAG PIPE Sale!

- Why pay fancy prices? Genuine imported briar pipes ridiculously low priced. Slight imperfections make them unacceptable to famous makers. For shape and size selections trust our judgment. You can't get stuck because of **MONEY BACK GUARANTEE.** Save plenty and be delighted! No dealers.

**2 Pipes $3.00—4 for $5.00 Postpaid**

Mail Orders Only to Dept. PS

**COLLECTORS' PIPES** 101 Cedar Street New York 6, N.Y.

## KEEL-GUIDED BOAT ROLLER

FOR BOATS and CANOES. Easily mounted to dock, pier, trailer. Boat rolls on even keel, simplifies handling. Cuts damage and repair cost. Rollers of hard durable rubber. Assembled ready to use, $7.95, F.O.B. FREE FOLDER. See your dealer or order from BERG CO., Madison 4, Wis.

# GEARS

**In Stock—Immediate Delivery**

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blueprints and inquiries.

*Send for Complete Catalog No. 220*

CHICAGO GEAR WORKS
440-450 N. Oakley Blvd. Chicago 12, Ill.

## TUMBLING-HANDBALANCING

Learn flips, handbalancing etc. quickly. Complete self-teaching course $1.00. Money-back guarantee. **W. Power, 923 W. Vine, Kalamazoo, Mich.**

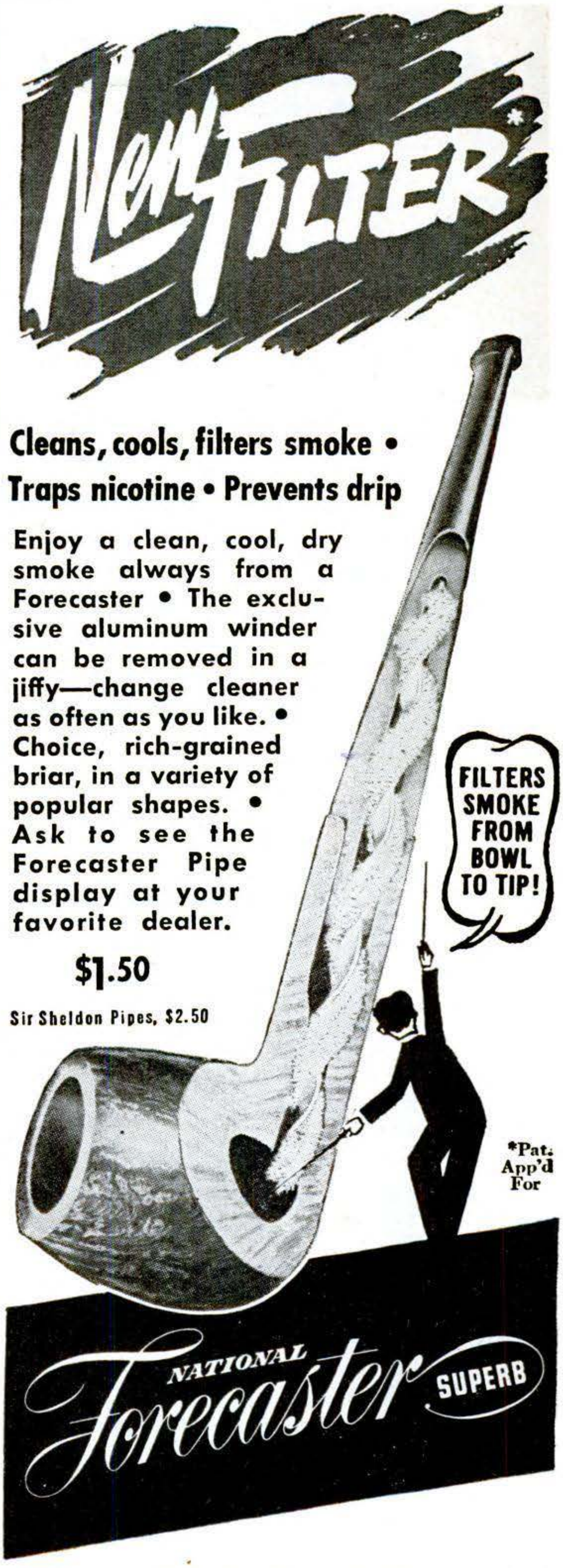
# MAKE MONEY AT HOME

## RUBBER MOLDS Low as 6¢ EA.

**Amazing rubber mold-making outfit makes perfect flexible molds of plaques, ash trays, bookends, etc. Molds cost 6c to 25c each. Each mold makes hundreds of novelties and gifts to sell for $1.00 apiece and more! No experience necessary. Everything furnished. Quick and easy.** Start profitable business in your home—sell to **stores, gift shops, friends, resorts, road stands** by mail. Full or spare time. Write for complete FREE details and easy instructions

**SO-LO WORKS, INC., Dept. F-801, Loveland, Ohio**

# Only Forecaster Superb Pipes have this




**Cleans, cools, filters smoke • Traps nicotine • Prevents drip**

**Enjoy a clean, cool, dry smoke always from a Forecaster • The exclusive aluminum winder can be removed in a jiffy—change cleaner as often as you like. • Choice, rich-grained briar, in a variety of popular shapes. • Ask to see the Forecaster Pipe display at your favorite dealer.**

**$1.50**

Sir Sheldon Pipes, $2.50

**NATIONAL BRIAR PIPE CO • JERSEY CITY, N. J.**

Copyrighted material

# Stop! WASTING YOUR MONEY

## On Needless Oil Changes and Preventable Motor Wear!

**Auto-Truck-Tractor Owners-**

For perfect lubrication WITHOUT PERIODIC OIL CHANGING attach "**Reclaimo,**" the world renowned **Heated** Oil Filter and Re-Refiner! Removes **Solids** PLUS **Moisture, Dillution** and **Acids** from crankcase by Filtration and EVAPORATION thereby maintaining the "Oiliness" and **Stability** of the oil indefinitely!

**OIL NEED NEVER BE CHANGED!**

***(Added only as needed)***

Tremendous savings on oil costs and smoother running, longer lasting motors can be yours with the use of **"Reclaimo".** To fully appreciate the matchless performance of this remarkable device, you MUST read our FREE Booklet "Oil Facts". It will be a revelation to you—write for it TODAY!

**RECLAIMO MFG. CO.**

**5085 N. Elston Ave., Dept. 10, Chicago 30, Ill.**

**THOUSANDS NOW IN USE!**

**FULLY GUARANTEED!**

**'RECLAIMO'**

Wm. Schwalge Patents Nos. 1757223 - 1834654 2068473

**"Oil Does Not Wear Out"**

**U.S. BUREAU OF STANDARDS**

# Now for EVERY WORK SHOP!

**NEW Invention**

# Electroplates by BRUSH

## Easy to Plate CHROMIUM

**GOLD, SILVER, NICKEL, COPPER**

***. . . For Pleasure and Profit!***

If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replate worn articles, faucets, tools, fixtures, silverware, etc. with a durable, sparkling coat of metal . . . Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick. Everything furnished—equipment complete, ready for use. *By doing a bit of work for others, your machine can pay for itself within a week.* So make your shop complete by getting a Warner Electroplater right away. Send today for FREE SAMPLE and illustrated literature. ACT AT ONCE! *Mail Coupon.*

**WARNER ELECTRIC CO., DEPT. H-11**
**663 N. Wells St., Chicago 10, Illinois**

# FREE *Details & Sample!*

**WARNER ELECTRIC CO.,** 663 N. Wells St., Chicago 10, Dept. H-11

Gentlemen: Send Free Sample and Details to:

*Name* _____

*Address* _____

*City* _____ *State* _____

# MEN WANTED!

## GOOD MONEY *NOW* and *a Bright* POST-WAR FUTURE

Returning Veterans . . . office and factory workers . . . others! If you want to enjoy a FINE INCOME NOW, with even greater opportunities in the future, write us today! We are a nationally known manufacturer of Fire Fighting equipment . . . including "AUTOFYRSTOP," the amazing combination fire extinguisher and alarm that holds unequalled records. Our products sell FAST and in QUANTITIES to factories, schools, stores, homes. NO EXPERIENCE NEEDED. Write for FREE FACTS!

**AUTOFYRSTOP CO., Dept. P-56, 2035 Washington Ave., Philadelphia 46, Pa.**

# "WONDER" ELECTRIC BUTTON

**Most interesting electrical apparatus ever discovered. Make your own Telephone-Amplifier Detectiphone. Transmit your voice or music to distant rooms. Perform hundreds of fascinating experiments. So tiny it can be concealed in dozens of places. Send $1 now for button and free 5,000 word instruction booklet with 50 illustrated experiments. SPECIAL OFFER 6 buttons and booklets sent post-paid for $5. Write now to**

**BUCK MFG. COMPANY** **North Aurora, Illinois**

# A Penny May Bring You HAPPINESS!

Would you gamble a penny to win Happiness, Companionship, Love, Financial Success, through the help of a mysterious International Secret Organization? Then just send name and address on a post-card TODAY for your FREE Copy of great Book "Mayan Mysteries". It can change your whole life! **Address Rose Dawn, The Mayan Order, Dep't. 70, P.O. Box 2710, San Antonio, Tex.**

# NEW OTTAWA SAW

**BIG FREE BOOK**

**World's Fastest 6 H.P. EASY to MOVE**

**Fells trees.**

**Saws big logs, small logs, limbs.** Pulley for belt work. Easy to handle, weighs less than lower powered units. FULLY GUARANTEED. Cash in on fuel shortage. Turn wood lots into cash.

**OTTAWA MFG. CO. 501 PINE ST. OTTAWA, KANS.**

# HIGH BLOOD PRESSURE

## A DANGER SIGNAL

Often associated with Hardening of the Arteries, a Stroke, Paralysis, Heart Trouble, Kidney Disease, and other grave complications. Resultful treating methods of the Ball Clinic have proven dependable for nearly a quarter of a century. Send for FREE Blood Pressure Book today. No obligation.

**BALL CLINIC, Dept. 5160, Excelsior Springs, Mo.**

# BREATH TAKING BEAUTIES!

**IN FULL COLOR FOR ART STUDY**

***World's Finest Viewer***

Thrilling, colorful transparencies of beautiful Hollywood Models . . . so real . . so lovely they'll take your breath away.

**See For Yourself 2 Full Color 35mm. Slides ONLY $1.00**

## HOLLYWOOD PROFESSIONAL VIEWER

Life-like, crystal clear magnification comparable to theatre screen projection. For 35 mm. slides, strip film and 8 or 16 mm. movie film. ★ Special Combination Offer—Two exquisite transparencies of lovely Hollywood Models and sensational Hollywood Professional Viewer — BOTH FOR ONLY $3.50

**Special Combination Offer** 2 Art Model Slides and Hollywood Professional Viewer **$3.50**

**Studio Guild, Dept. 5, Box 830, Hollywood 28, Calif.**

☐ Send Special Combination Offer for only $3.50 ☐ Find enclosed $_____

☐ Send 2 full color art Model slides for only $1.00 ☐ Send C.O.D.

**IF MONEY ORDER OR CHECK IS ENCLOSED WITH ORDER, WE WILL PAY POSTAGE**



Copyrighted material

## Electrically Welded Endless

# *Paramount*

## BAND SAW BLADES

**Made in widths from 1/8" to 1-3/4"**

Make your band saw do more work for you. The proper width of blade will extend the scope of this important machine. Burrill's Paramount Blades are made from tough Nickel Alloy Steel properly tempered. Teeth accurately set and filed, and all saws carefully straightened. Send order and check today. Delivery will be made as promptly as conditions permit, from a few days to a week or two. You can obtain these saws at the following prices:

⅛"-3/16"-¼"-⅜" wide, 5'6" long.....$ .90 each
⅛"-3/16"-¼"-⅜" wide, 6'6" long..... .95 each
⅛"-3/16"-¼"-⅜" wide, 7'6" long..... 1.10 each

Other sizes at proportional prices

**ALSO METAL CUTTING BAND SAWS**
**Made in widths from 1/8" to 3/4'**
**Your satisfaction is guaranteed**

**BURRILL SAW & TOOL WORKS**
**405 E. Main St., Ilion, N.Y.**

## HOW TO CUT RAFTERS

New vest pocket book gives lengths, Side cuts, Plumb cuts, Deductions. For all rafters for any building from one inch to forty feet wide. Gives numbers to cut on square. Also degrees for same cuts for Radial Saws. All standard pitches from ⅛ to ⅝. Just open book to pitch page and there are your lengths, side cuts, etc. Anyone who knows what a jack rafter is can frame a roof if he has this great book. Price one dollar prepaid. **BUILDERS' TOPICS, Dept. S, Med. Arts Bldg., Seattle 1, Wash.** Original teachers of the square in five easy lessons by mail. Send for FREE list of plan books—Kamp Kabins to Mansions.

## COLORED PLASTICS

The very latest and most practical for craftsmen's projects. Gem-like beauty—as easy to work with as wood. In five rich colors—mottled opaques and translucent. All new stock with masked polished surfaces. In 3/16" and ⅜" sheets, 6 x 6" to 12 x 24" and 1" and 1½" diam. rods 10" and 20" long. Write for low price list.

**SPECIAL INTRODUCTORY OFFER** Kit for matched set of cigarette box, ashtray and matches holder complete with plans and adhesive, shipping wt. 2 lbs., only $3.80. Set is easily worth $20.00 retail. Specify choice of marble-tone green or translucent tortoise shell. Send $3.80 on money back satisfaction guarantee and we'll pay postage. Or send no money and pay postman C.O D. plus postage.

**HANSON PLASTICS** 7625 South Park Ave., Dept. B, Chicago 19, Illinois

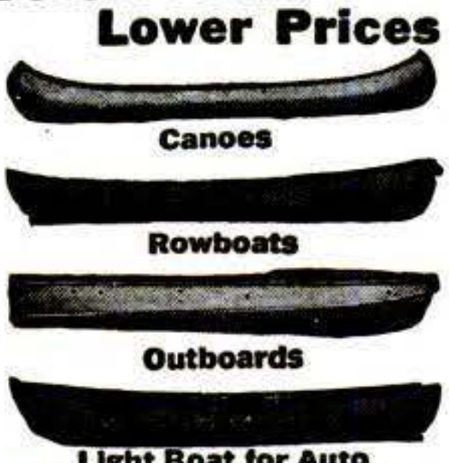
## WHITTLER'S KIT

10 assorted soft white pine blanks—ready to whittle to the finished products. Also included an X-ACTO MODELLING KNIFE with complete instructions. EASY—FUN! Complete kit send prepaid for $2.00. Write now to

**OLD WHITTLER, Dept. PS-5, 1402 Charles St., LaCrosse, Wisconsin**

## Thompson BEATS the World on BOATS

**Better Built Lower Prices**




**Safe Boats With Full Length Spray Rails**

Keep passengers perfectly dry—even at high speeds. Catalog also shows two new models of "Take-Along" Boats. Two big factories—save you freight.

**CATALOG FREE**
Write for your copy. State kind of boat in which you are interested.

**THOMPSON BROS. BOAT MFG. CO.** (151)
219 Ann St. PESHTIGO, WIS. (*Write to either place*) 119 Elm St. CORTLAND, N.Y.

# REPAIR RADIOS
## Easily and TWICE as FAST

**COVERS OVER 4,800 models of home and auto receivers of 202 manufacturers! ONLY $5**

### A Complete Modern Guide for LOCATING & REPAIRING RADIO SET TROUBLES

Let Alfred A. Ghirardi show you the "secret" of repairing radio receivers fast and profitably—in half the usual time, and without elaborate test equipment! His famous RADIO TROUBLESHOOTER'S HANDBOOK is not a study book. It goes to work the minute it arrives. Just look up the radio's Make, Model and Trouble Symptom and go to work!

### "TEST" IN 2 MINUTES

Clear instructions tell exactly what the trouble is — exactly how to fix it. No guesswork. No needless testing. Nine times out of ten, the HANDBOOK gives all the detailed data you require — in 2 minutes or less! A real money-maker for anyone who likes to do radio work. Pays for itself first time you use it. Weighs 4½ lbs. Has 744 big, manual-size pages. Covers specific repair data for practically every radio in use today. In addition, there are hundreds of pages of helpful repair charts; tuning alignment data; transformer servicing hints; color codes; tube data, etc.—all designed to help you repair any radio ever made—easier, better, faster. Order today. **ONLY $5 COMPLETE.** Our UNRESERVED 5-DAY MONEY-BACK GUARANTEE is your absolute protection.

## BE A PROFESSIONAL RADIO SERVICE EXPERT

**Prepare at Home for Big Money in Scientific Radio-Electronic Servicing**

Who is going to repair the millions of new radios, F-M and Television Receivers and complicated industrial Electronic Equipment? Only men with real professional Know-How can do the job—and nowhere can you get the needed training easier, quicker and at less cost than in Ghirardi's famous MODERN RADIO SERVICING. Explains test instruments, how to interpret their readings, how to trouble-shoot circuits scientifically; how to test, repair and replace faulty components, installation, etc., etc. Complete course—easy to understand, 1300 pages; 706 illustrations; 720 self-test review questions. Only $5—and our 5-DAY MONEY-BACK GUARANTEE means you don't really risk a cent!

**SPECIAL OFFER**

Let the **Handbook** save time on common jobs. Let **Modern Radio Servicing** train you for PROFESSIONAL work. Get BOTH big books at only $9.50 for the two. See coupon.

## COMPLETE COURSE IN BASIC RADIO-ELECTRONICS... *Only* $5

### FOR BEGINNERS . . . 36 COURSES IN ONE

No matter what phase of Radio-Electronics-Television work you plan to enter, a knowledge of the basic fundamentals is essential. Ghirardi's big 3½-lb. 972-page RADIO PHYSICS COURSE book gives just the training you need—ALL YOU NEED—at a price you can afford. Many beginners have completed it at home in a few weeks. More widely used for Home Study and by more Signal Corps, Navy and civilian schools than any similar book or course. Study it for 5 full days. Our MONEY-BACK GUARANTEE protects you! Use coupon today!

### 5-DAY MONEY-BACK GUARANTEE

**Dept. PS.56, MURRAY HILL BOOKS, INC.**
**232 Madison Ave., New York 16, N.Y.**

☐ Enclosed find $..... for books checked; or ☐ send C.O.D. (U.S.A. only) plus postage. If not fully satisfied, I may return books within 5 days and get my money back.

☐ RADIO TROUBLESHOOTER'S HANDBOOK $5 ($5.50 foreign)
☐ RADIO PHYSICS COURSE $5 ($5.50 foreign)
☐ MODERN RADIO SERVICING $5 ($5.50 foreign)

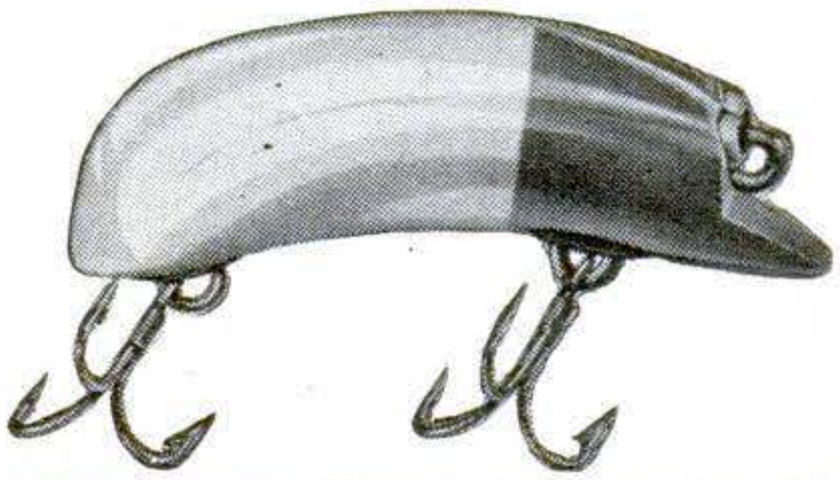
☐ **MONEY-SAVING OFFER** Modern Radio Servicing AND Troubleshooter's Handbook, $9.50 for the two. A complete radio service library. ($10.50 foreign)

Name .....
Address .....
City & Dist. No. ..... State .....
*(Please write or print plainly)*



Copyrighted material

# BRIGHT EYES



The sweetest casting lure you've ever used. Its ultra modern design—its exciting, whip-like action—its appeal to ALL game fish—its bright staring eyes that literally bore a path through the water—make it a must for the coming fishing season. Either a deep running, or surface lure, depending on speed of retrieve. Made of tenite, with two #1 P & K American made, nickel plated, treble hooks with extra sharp ground points. In 8 flashing color combinations. No. 44RW (Red & White), 44WL (Black body with white lateral line), 44YP (Yellow Perch), 44F (Frog), 44P (Pike), 44R (Rainbow), 44GS (Green Scale), 44PR (Pearl). $1.10 each.

## "ADVENTURES IN FISHING"

Just off the press. 32 pages—articles by Cal Johnson, famous outdoor writer and fishing authority—pictures in full color of P & K Lures and Accessories—hunting and fishing photos, etc. A regular 10¢ package of Raparound, the Invisible Ribbon Sinker, a MUST for Fly Fishermen, and this booklet, for only 10c, mailed postpaid. SEND YOUR DIME TODAY!

P K

**PACHNER & KOLLER, INC.**
**3454 Archer Ave., Chicago 8, Ill.**

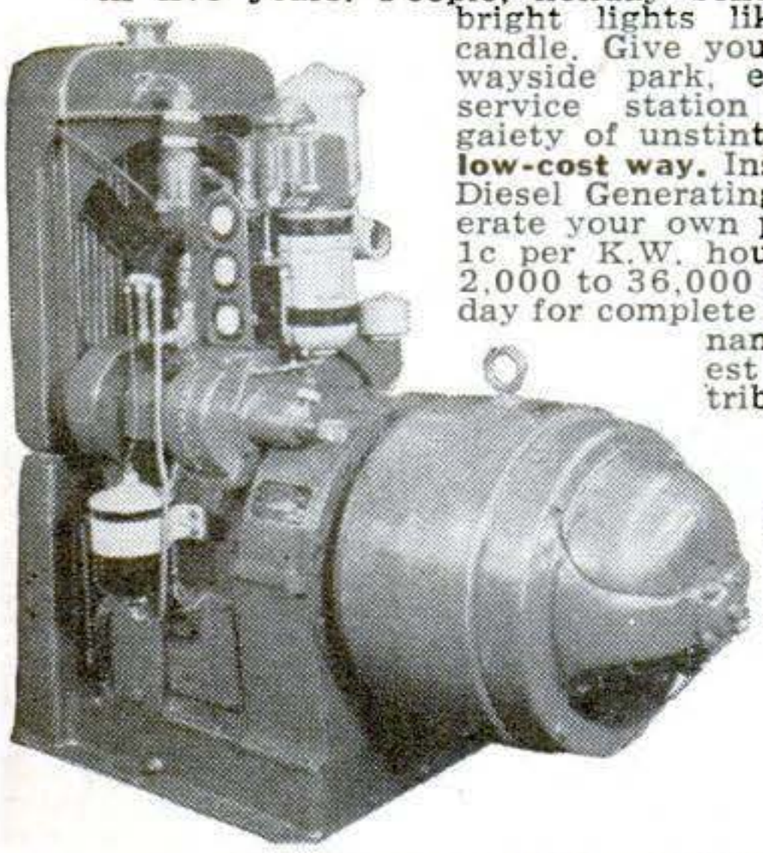
**TESTED AND PROVED LURES AND FISHING ACCESSORIES**

---

**IT PAYS TO BE EXTRAVAGANT WITH**

# 1¢ electricity

This summer thousands of tourists will jam the highways . . . many of them on their first vacation in five years. People, holiday bent, are drawn to bright lights like moths to a candle. Give your tourist camp, wayside park, eating place, or service station the sparkling gaiety of unstinted lighting, the **low-cost way.** Install a Sheppard Diesel Generating Set and generate your own power for about 1c per K.W. hour! Models from 2,000 to 36,000 watts. Write today for complete information and name of your nearest Sheppard Distributor.



**Generating sets**
**2,000 to 36,000 watts**

**Power Units**
**3¾ to 56 H.P.**

**Marine Engines**
**3¾ to 62 H.P.**

**R. H. SHEPPARD COMPANY, INC., 68 Middle St., Hanover, Pa.**

**DIESEL'S THE POWER - Sheppard's THE DIESEL!**

---

# WELD ANYTHING ANYWHERE ANYTIME

## ALL PURPOSE ARC WELDER

*9 Models . . . 32 Volt D.C., 110 to 440 A.C.*

* A complete workshop in itself! Weld, cut, braze or solder any type metal; iron, castings, aluminum, steel, bronze . . . in any gauge or weight, with equal ease. Compact, complete, as sturdy as the Rockies. Formed steel and cast aluminum case, welded steel base, 4" cast wheels. Built with voltage control. Better on R.E.A. lines. Completely equipped. No instructions needed. Sold throughout the world. Several dealer territories open. Write:

**FORNEY MFG. CO.**
**FORT COLLINS 3, COLORADO**

---

## GAS ENGINES IN STOCK

The G. H. Q. miniature gasoline engine that really operates is now available. Over 100,000 sold to date. 1/5 H. P. Complete with coil and condenser and full illustrated instructions for only $9.95. Fully bench tested and ready to run. Power for all models. Send only $1.00 —Shipped Collect C.O.D. same day. Send for **free** illustrated Catalog of hundreds of hobby items.

**GHQ MOTORS, Dept. SX56, P. O. Box 193, Sta. O, N. Y. 11, N.Y.**

---

**FLIGHT JACKET INSIGNIA**

**With your own first name Come and get 'em for only . . . . . 50c Post paid**

Dress up your sweater, blouse, or lumber jacket and look just like the men that fly our big bombers. Indicate selection by number and print carefully your first name, or your nick name. Mail with 50c today. Agents Make Money—Take orders. Sell for **$1.00.** Illustrated book of all Army Insignia Emblems only **25c.**

**INSIGNIA MART**
**703 Broadway, Dept. S New York 3, N.Y.**

---

## BALL BEARING CENTERS

with #2 Morse Taper . . . **ONLY $2.75**

at your Dealer or Post Paid.

**ME-RE-LAB. 57 Bergen Turnpike, Little Ferry, N. J.**

---

*Burn Your Name On Tools* **Electro Name Etcher** *Only* **$1**

**PROTECT** valuable tools from thieves and tool borrowers! Electro Etcher BURNS your name, any design, permanently on tools, instruments, dog collars, any metal. Easy! Simple as writing with pen or pencil. Rush order today—supply limited—no more when these are gone! **SEND NO MONEY!** Pay postman $1.00 plus few cents postage on delivery. Use 5 days—money back if not delighted. **Electro Etcher, Dept. G-603, Strader Ave., Cincinnati, O.**

---

# RUPTURED?

## Get Relief This Proven Way

Why try to worry along with trusses that gouge your flesh—press heavily on hips and spine—enlarge opening—fail to hold rupture? You need the Cluthe. No leg-straps or cutting belts. Automatic adjustable pad holds at real opening—follows every body movement with instant increased support in case of strain. Cannot slip whether at work or play. Light. Waterproof. Can be worn in bath. Send for amazing **FREE** book, "Advice To Ruptured," and details of liberal truthful 60-day trial offer. Also endorsements from grateful users in your neighborhood. Write:

**Cluthe Sons, Dept. 14, Bloomfield, New Jersey**

*(Serving the Ruptured Since 1871)*



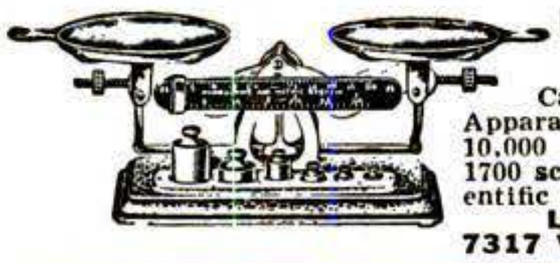
Copyrighted material

## PAINTERS' STRIPING TOOL

NOW! PAINT STRIPING MADE EASY!

Easy to use as a pencil! Draws parallel lines, straights, curves, circles with paint, enamel, lacquer, etc. Do your own striping on autos, furniture, toys, bikes, model planes, signs, linoleum . . . make wall board look like tile. Painters—craftsmen, order today! Type "M" Master Painters' Striping Tool complete with tip for 1/16" stripe, $1.00. Extra tips 1/64", 1/32", 3/64", 1/16", 5/64", 3/32", 1/8"—75c each. Tool with complete set of 7 tips $5.00 (C.O.D. orders 25c extra.) Dealers write!

**WENDELL MFG. CO.**
4234-A Lincoln Ave., Chicago 18, Illinois



**Balance 4"x 9" Base. With either Metric or Avoirdupois Weights . . $6.00**

Catalog with 3000 illustrations of laboratory Apparatus sent for 75 cents. Catalog listing 10,000 chemicals, drugs, minerals, etc., and 1700 scientific books sent for 25 cents. 100 scientific books, 10 cents.

**LABORATORY MATERIALS CO.**
7317 Vincennes Ave. Chicago 21, Ill.

GENUINE PRE-WAR QUALITY

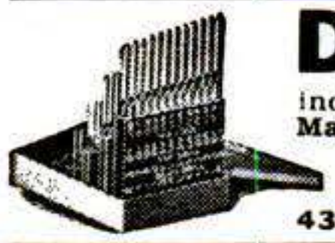
## FIREWORKS! OH-BOY

Banner has always been right there with the newest and best in fireworks. Now we give you JET PROPULSION . . . an amazing rocket plane that can be used over and over again. Write quick for details of this newest sensation in fireworks. It's astounding. It's colossal.

**BIG SPECIAL OFFER $4.95**

Giant assortment of over 150 pieces, including 2-3-5 inch salutes, star shells, aerial bombs, flower pots, skyscreamers, battle-in-the-clouds, Roman candles, tubular salutes, and many others . . . regular $8.15, retail value for only $4.95. Rush your order. Supply limited. Catalog FREE.

**BANNER FIREWORKS MFG. CO., INC.**
DEPT. 111 TOLEDO 12, OHIO



## DRILL-INDEX

A compact container for indexing and filing twist drills. Eliminates search. Made entirely of steel in nine sizes. See your dealer or write to

**HUOT MFG. CO.**
436 Foot Schultz Bldg. St. Paul 1, Minn.

## KEEP a CAN of BOTH ON HAND!

**Heavy 3-IN-ONE**

Refrigerators, mixers, motors, power tools, lawn mowers, ironers.

**Light 3-IN-ONE**

Sweepers, sewing machines, hinges, guns, locks, metal drawers.

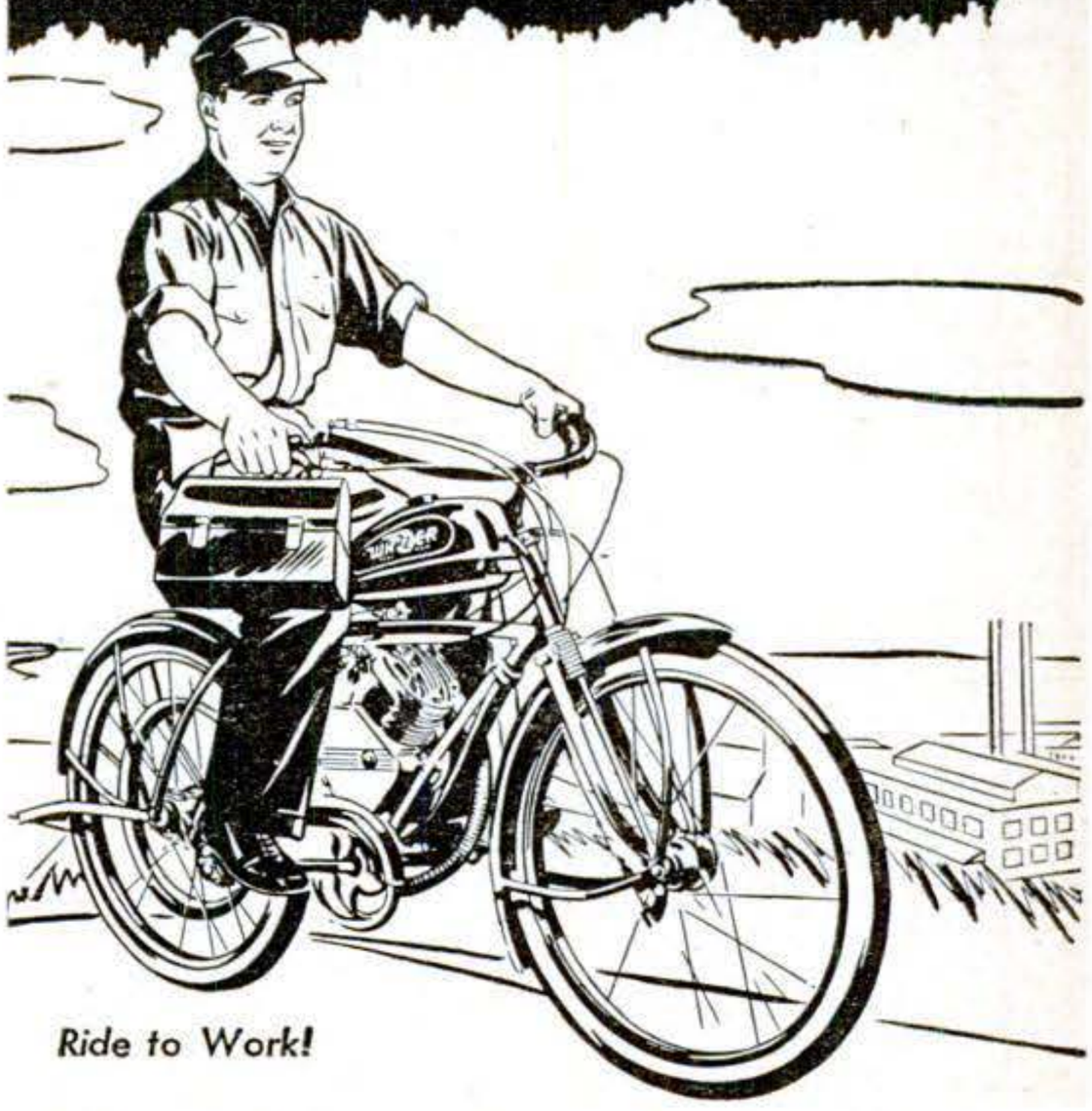
**For over 50 years America's accepted household oil!**

SOLD EVERYWHERE IN 1 AND 3 OUNCE CANS

REPLACEMENT OR REFUND OF MONEY ★ Guaranteed by Good Housekeeping IF DEFECTIVE OR NOT AS ADVERTISED THEREIN

## 3-IN-ONE Oil

## NOW! RIDE wherever you go with NEW WHIZZER BIKE MOTOR



*Ride to Work!*

Whizzer is compact, sturdy, powerful; you can install it easily within the frame of any balloon-tired bike to give you personal, dependable, low-cost transportation. Whizzer's 2½ horsepower, driving the rear wheel through a V-belt unaffected by weather and road conditions, will take you swiftly and comfortably along streets, roads and trails. 125 or more miles on a gallon of gas; 5 to 35 miles per hour. Open up new avenues of adventure with Whizzer! Put a Whizzer on *your* bike now! WHIZZER MOTOR COMPANY, Pontiac 15, Michigan.

FACTORY LIST PRICE **$89.50** PLUS TAX

*Whizzer on your bike will take you anywhere! One owner rode from Los Angeles to Pontiac, Michigan, in 9 days! Reports 3500 miles at a total cost of $5.47. "A swell trip," he says.*

**IF NO LOCAL DEALER, USE COUPON**

WHIZZER MOTOR COMPANY
Dept. 185, Pontiac 15, Mich.
I enclose $91.60, including $2.10 Federal Excise Tax, ( ) check or ( ) money order. Send me one Whizzer motor, complete, with full installation instructions, tax paid. Written guarantee with every motor.
*If descriptive literature only is desired, check here ( ).*

NAME_____

ADDRESS_____

CITY_____ STATE_____

Copyrighted material

**This Fine 3 Element Lens Included in the List Price of This FEDERAL Enlarger**

Federal provides no less than ten *extra value* features, many of them unavailable in much higher priced Enlargers. Typical of these plus values is the 3½" F6.3 Fedar Anastigmatic Lens with built-in iris diaphragm provided as standard equipment with the popularly-priced Federal Model 219. Corrected for chromatic *(color)* and spherical aberrations, every lens is individually adjusted and tested in an enlarger to provide *extra* assurance that enlargements will be sharp, sparkling, color-correct.

**"ENLARGING IS THRILLING"**—*All you have to know about enlarging in 48 amusing, wisdom-packed pages. "A Gem," says Keppler.*

**25c AT CAMERA STORES EVERYWHERE**
*or send 25c (no stamps, please) to*

FEDERAL OF BROOKLYN
**FEDERAL MANUFACTURING & ENGINEERING CORP.**
Makers of Photographic & Electronic Devices
**213 STEUBEN ST., BROOKLYN 5, N.Y.**

# OPTI-LOCATOR
**FOR HIGH PRECISION IN BORING TO LAYOUTS**

OPTI-LOCATOR chucks in any machine tool; locates spindle axis in exact alignment with layouts, punch marks or reference points. Compensates for spindle run-out, saves set-up time, eliminates source of errors before they occur. *Get jig boring accuracy with OPTI-LOCATOR for only* **$24.50!** FREE FOLDER!

**THE BENTON COMPANY,**
Dept. P, 351 S. La Brea Ave., Los Angeles 36, Calif.

# OTTAWA TRACTOR SAW

FREE BOOK and Price List

**350 CUTS PER MINUTE**

**Make money sawing wood. Use Ottawa—fastest cutting. Cuts large, small logs easiest way. Fells trees. One man operates. Thousands in use. Built to last with heavy, stiff saw blade. Positive safety clutch control; uses power take-off any tractor.**

**OTTAWA MFG. CO., D501 Forest Ave., Ottawa, Kan.**

# SILVER SOLDER KITS!
**For Silver Soldering ALL METALS**

SOMETHING NEW. Electricians, jewelers, dentists, garages, field service repairmen, machine, refrigerator, and all types of brazing and fix-it-shops. **$2.00 POST-PAID**

**KIT INCLUDES**

One 3 oz. Tube XCEL-FLUX "SS" Silver Solder Paste. 20 5-inch lengths (total 100 inches) of SILFOS and EASY-FLO Silver Brazing Alloy—⅛" - 1/16" and 1/32" wires, and one EASY-FLO. 005" x 1" strip.

TRIAL SIZE with 45 in. Silver Solder Wire $1.00.

**PREST-O-LITE 4-in-1 TORCH OUTFITS**

For very fine to heavy Brazing & Silver Soldering, complete with carrying case $6.50. Type MG gas tanks, 10 cu. ft. $6.50. Type B, 40 cu. ft. $12.50. Prices F.O.B. shipping point. Cash with order.

**AMERICAN PRODUCTS CORP., 806 Lowell Bldg., Chicago 5, Ill.**

# EYE-GLASSES by MAIL as Low as $2.95

***Send No Money!***

**16-Day Trial Offer**
**NEWEST STYLES**

**FREE** Scientific Sight Test Chart and Catalog. Write today.

**U.S. EYE-GLASSES CO.** 1557 MILWAUKEE AVENUE Dept. 5-42, CHICAGO, ILL.

# PAINT IT *Yourself!* with TIME AND WEATHER TESTED *Plasti-Kote*

## AUTO & BOAT FINISHES

Autos-boats-trucks-planes . . . use Plasti-Kote wherever you want a gleaming durable finish. Styled to the tempo of modern streamlined transportation. Plasti-Kote leaves a cellophane-like surface that resists hot or cold water, alcohol, dirt, oil, vibration and changing weather. Dries in three hours - leaves no brush marks. Approved by Underwriters Laboratory and other testing bureaus. 36 colors. $2.95 quart.

**PLASTI-KOTE CO** 400 LAKESIDE AVE., N. W. CLEVELAND 13, OHIO

*Send new color folder and descriptive literature:*

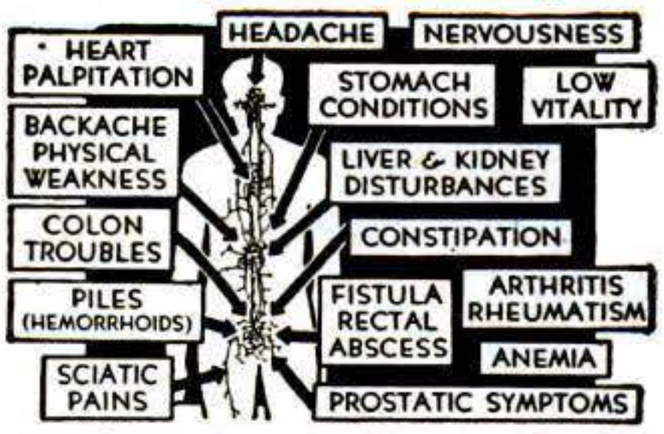
Name .....

Address .....

City ..... Zone ..... State .....

# Good News To Fistula Sufferers

**Interesting FREE BOOK on Dangers of Delay**




Illustrated, authentic 40-page book on Fistula, Piles (Hemorrhoids), related ailments and colon disorders is yours FREE. Write today. Thornton & Minor Clinic, Suite 549, 926 McGee St., Kansas City, Mo.




Copyrighted material

# with the *Repeating* G-BOY CAP PISTOL

ALL METAL—SILVER FINISH

- **Shoots 50 caps automatically**
- **Rapid firing**
- **Looks like a real '45**
- Explodes with a "Bang"
- Actually smokes when fired
- Holds a 50 Cap Roll—easy to load
- Full sized plastic hand grip

*De Luxe Model 7" Long*

**PISTOL ONLY $1.95**

**PISTOL and 20-50 Cap Rolls ..... $2.50**

**EXTRA CAPS 35 Rolls (1750 Shots) ..... $1.00**

## ORDER NOW—SATISFACTION GUARANTEED

Enclose $2.50 for G-BOY REPEATING CAP PISTOL and 20-50 Cap Rolls (1000 shots)—shipped express charges collect. Better include $1.00 additional for 35 extra Cap Rolls (1750 shots). Satisfaction GUARANTEED!

**GAMCO, 215 W. Illinois St., Dept. PS-5, Chicago 10, Ill.**

---

# *Now* Hear Better

## THE AMAZING NEW *Beltone* WAY

COMPLETE IN ONE POCKET-SIZE UNIT (with cord and plug)

AMERICAN MEDICAL ASSN. ACCEPTED COUNCIL ON PHYSICAL MEDICINE

Beltone Mono-Pac brings you a new world of sound—amazingly clear, natural—perfected by advanced electronic research. One lightweight unit—about the size of a spectacle case—does it all. Weighs about one-half as much as old style hearing aids with no clumsy, separate battery pack, no battery wire. Such a sensational advance that already tens of thousands of hard-of-hearing people have been delighted with how splendidly they hear now with this tiny but powerful device.

*Send Post Card Today for*

**FREE BOOKLET**

with valuable information for hearing problems.

**BELTONE HEARING AID CO., Dept. PS-5**

**1450 W. 19th Street, Chicago 8, Illinois**




Copyrighted material

# DON'T MISS THIS DOUBLE HEADER!

**Yes, Softballers here's a real double header! And you'll be right every time with this great combination . . . a genuine Louisville Slugger Softball Bat and a copy of the 1946 H&B Official Softball Rule Book. It always pays to play with the best and to know all the rules of the game.**

*Ask your dealer for the new 1946 Official Softball Rules or send 10¢ in stamps or coin to Hillerich & Bradsby Co., Inc., Dept. Z-34 Louisville, Ky.*

LOUISVILLE SLUGGER — HILLERICH & BRADSBY Co. — LOUISVILLE, KY.

## Louisville SLUGGER BATS
FOR SOFTBALL & BASEBALL

---

AIR RIFLES **BENJAMIN** AIR PISTOLS
ARE IN PRODUCTION

**ORDER BENJAMIN AIR RIFLES & BENJAMIN AIR PISTOLS**

from your **DEALER.** Send for our **FREE FOLDER** and Complete Specifications **TODAY.** Both Calibre Benjamin H-C Pellets are available now.

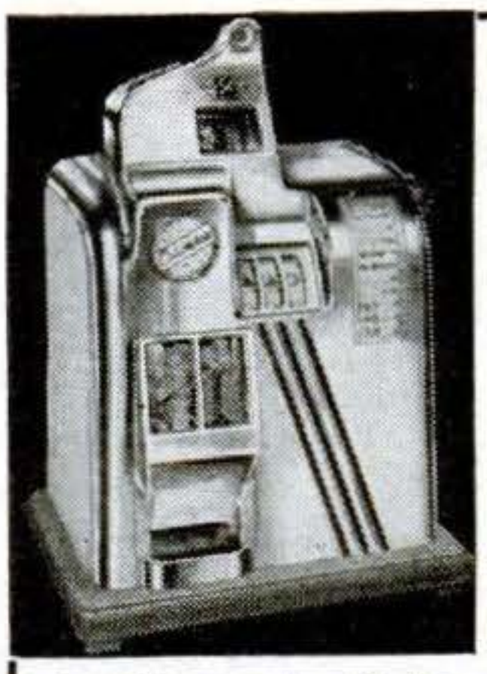
**BENJAMIN AIR RIFLE CO., 811 MARION ST., ST. LOUIS 4, MO.**

---

**$$$$ if trained in arc welding**

Big income jobs await you. Learn quickly and thoroughly. Enroll under G. I. Bill. Write today.
Hobart Trade School, Inc., Box P-563, Troy, O.

---



# "JACKPOT"
## Home Model COIN MACHINE

Great fun-maker for recreation room or club. Soon pays for itself. Fully automatic payout, three reels, with all the usual winning combinations . . . . cherries, lemons, plums etc. Double jackpot. Handsome chromium plated cabinet. 5c per play. Guaranteed to satisfy or money back. Rugged lifetime construction. Ht. 22 in. Takes space 15 x 14 in. Shpg. wt. 55 lbs. Send $50.00 deposit, balance C.O.D. Express F.O.B. Chicago.

**Immediate delivery . . . . . Each, $265.00**

**Webb DISTRIBUTING COMPANY**
6 SOUTH KEDZIE AVENUE - CHICAGO 12, ILLINOIS

---

# The HELICOPTER

Looms big in tomorrow's transportation problems. Keep in touch with helicopter development and post-war plans . . . your name will be placed on mailing list FREE. Write today to

**THE HELICOPTER GUILDSMAN**
**Dept. 1365, 7614 Saginaw Avenue, Chicago (49) Ill.**

---

# JET PROPULSION

**Experimenters! New principle to drive boats, bicycles, model helicopters. Circular on plans. Rush name. H. Maupin, Tipp City 13, Ohio.**

---

## SAVE MONEY ON SURPLUS WAR GOODS

**RAINCOATS $1; Bolo Knives $3.75; Jeep Hats & Caps 10c; Overseas Caps 10c; Dungarees 95c; Tool Boxes $1; Gas Mask Bags 50c; Steel Helmets $1; Gun Slings 75c; Holsters 75c; Canteens 50c; Cups 15c; Mess Kits 35c; Leggings 25c; Cartridge Belts 50c; Rubber Wading Boots $2.95; Buzzer Phone $2; Portable Spark Coil Set $3. (ALL USED) Minimum Shipment $1, No C.O.D.**

**NEW YORK SALVAGE CO., 144 Chambers St., New York City**

---

New Catalog

**GENUINE U. S. BARGAINS**

| | |
|---|---|
| Army O. D. Wool Blanket, 5 lbs. | $5.95 |
| Army Pocket Knife, Scout Style. | 2.50 |
| Pup Tents, Poles and Pegs, Used | 4.85 |
| Mess Kit—Knife, Fork and Spoon, Used | .50 |

Thousands of other bargains in military, outdoor & sport goods for hunter, farmer, scout. Send 10c for 32 page catalog returned with first order.

**A and N SUPPLY CO.**
4784 LESTER ST. RICHMOND, VA.

---

*NEW IMPROVED MODEL!*

# NEW-ALL QUICK CHANGE GEAR BOX
*Increases Production up to 1000%*

PAYS FOR ITSELF IN 30 DAYS! Sold Under 30-Day Money-Back Guarantee

GUARANTEED ACCURACY! Is guaranteed to cut accurate threads from 4 to 224 per inch with approximately 3/1000 feed for fine turning. It safeguards entire production in process throughout the complete operation.

DRASTICALLY CUTS LABOR COSTS! No time lost finding gears. Inexperienced workmen easily produce top output. Easy to install. You simply drill and tap four holes.

PRECISION CONSTRUCTED! Precision constructed throughout with gears of quality hobbed steel. Gear Box housing is made of high grade aluminum alloy casting—with replaceable bronze bearings.

**NEW LOW PRICE . . . $75.00 F.O.B. Los Angeles**

**For Atlas, Craftsmen, Logan, South Bend 9-in., B & C and Powerkraft You Can Use Your Own Lead Screw.** *Write Div. 102*

*30-DAY Money-Back Guarantee!*

**WESTERN AIRCRAFT TOOL CO.**
650 No. Hoover St. Los Angeles 4, Calif. NOrmandy 2-4711



Copyrighted material

# POWERlite

**6-VOLT 2-LITE ELECTRIC LANTERN**

Millions now in use. 2-Lites: spotlight *plus* floodlight. Runs 80 to 100 hours on one battery. Rugged. Lenses don't break. At Hdwe., sport, electric dealers.

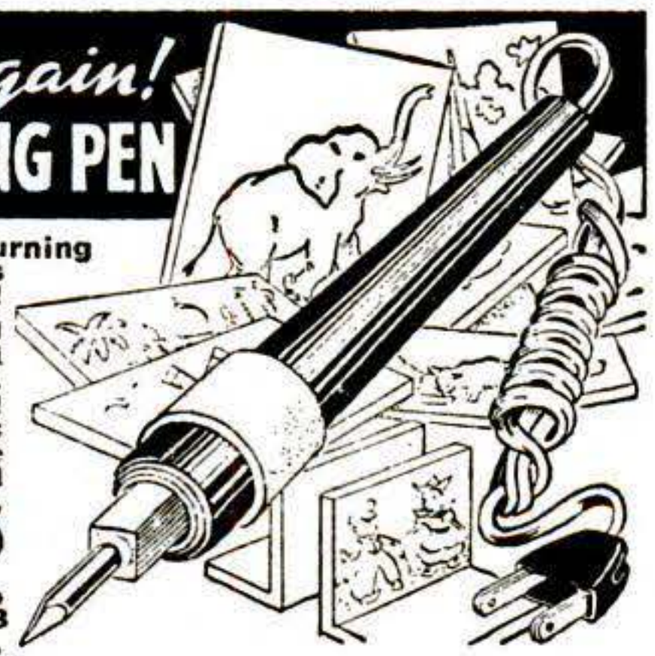
**$3.65** LESS BATTERY

**Delta**

**DELTA ELECTRIC CO.**
**MARION, INDIANA**

---

## It's Back Again! WOOD BURNING PEN



**Complete ELECTRIC Wood Burning Outfit—Burn Beautiful Designs in Wood—Comes Complete!**

**Safe, Constructive, Educational** Wood Burning Pen is equipped with the Sta-Kool Handle. Burn and etch deeply on wood in rich shades of brown. It's real fun. Comes complete with 10 different plywood plaques, design imprinted, and 1 plain plaque. All for only..... **$2.50**

Send check or money order to **UTILITY STORES, Dept. EE-13 117 S. Wabash, Chicago 3, Ill.**

---

## TUBULAR AXLES for TRAILERS, FARM WAGONS, TRUCKS and UTILITY

2,000 lb. capacity—Spindles ground and threaded—fit standard front auto hubs and bearings—58 inch track. SEND CHECK OR MONEY ORDER TODAY.

*Other types quoted on request.* (Prices subject to change without notice)

**$6.75** F.O.B. DETROIT

**SPARTAN INDUSTRIES**
8211 McDougall • Detroit 11, Michigan

---

# WAR SURPLUS BARGAINS

**BRAND NEW PARACHUTES,** 5' 8" in diameter, about 36 sq. feet cloth area, heavy shroud cords, direction control, quick opening attachment. Packed in a 4" x 5" heavy metal container. These white cloth parachutes can be made into wonderful beach umbrellas, women's blouses, children's play tents, etc. Container has many uses, including cemetery flower urn, which is what you definitely will need if you would be foolish enough to jump with this parachute! Sent POSTPAID for only $1.50, up to the 4th Zone only (600 miles from Phila.) Balance of U.S.A. $2.00 POSTPAID. All Foreign $3.00. We offer this special to put you on our mailing list, and include our latest illustrated catalog which is just off the press, and will also send supplement sheets listing new merchandise when received. Listed are binoculars, welding cable, heavy machinery, German gun sights, lanterns, camera tripods, lenses, etc. In fact, hundreds of bargains.

**CONVERSION OF GOVERNMENT SURPLUS CO.**
**3 S. Strawberry St. Phila., 6, Pa.**

---

# take Steam Heat along

## to your summer cottage!

### Luggage light—carry it anywhere

Imagine! A portable steam heating "plant"—no larger than a suitcase—that pours out an abundance of clean, healthful steam heat in minutes . . . by just plugging into an electric outlet!

### Fan-Circulated Steam Heat

Not a *spot* heater that "toasts" on one side. Efficient Wittie Steam Heater circulates *90 cubic feet* of steam heat per minute . . . evenly and gently throughout the room. Real cozy warmth on those chilly days in the country . . . Winter-long comfort at home as well!

### Safe and Economical

No glowing coils; heating element safe from prying fingers. Cabinet never gets hot. "Econo-miser" Control saves on current. Weighs only 32 lbs. 115 volts AC only. See new Wittie Heater at leading dealers now!

WITTIE MFG. & SALES CO., CHICAGO 5, ILLINOIS

**WITTIE**
**ELECTRIC Steam HEATER**



Copyrighted material

# FODECO
## POCKET VIEWER

MODEL 105 $11.95

An unusually compact Viewer for viewing and filing 2x2 Kodachrome Slides. All metal construction with rich brown crackle finish. The lens is of high quality, with uniform electric illumination, and will magnify your slides to brilliant lifelike pictures with three dimensional effect. Holds 56 ready mount slides. Viewer will fit the pocket, handbag or brief case. Send NOW for FREE folder No. PSM.

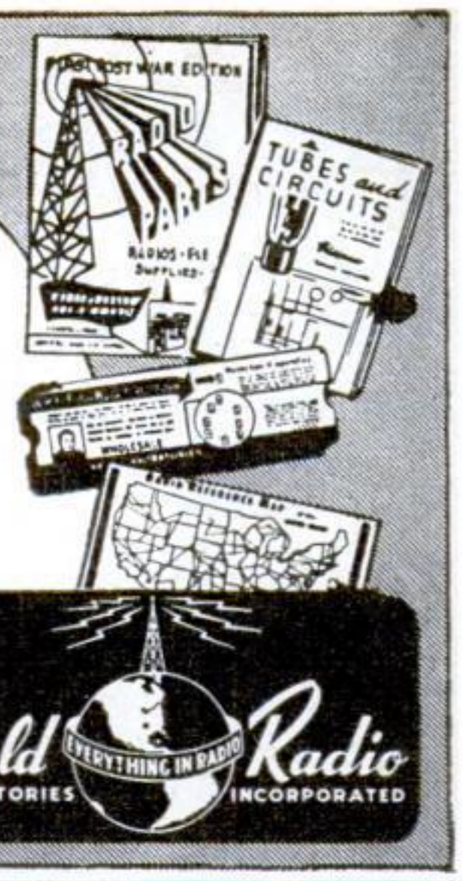
*Mail Orders Filled.*

*Willoughbys*

110 WEST 32ND ST. NEW YORK 1, N. Y.

World's Largest Camera Store Built on Square Dealing

IT'S EASY! IT'S FUN!



*Build Your Own*

• Transmitter Kits • Phono Amplifier Kits • Antenna Kits • Crystal Sets and many others.

**FREE! 52 PAGE CATALOG**

Tube and Circuit Book.....10c
Giant Radio Reference Map.....15c
Handy Tube-Base Calculator.....25c

ADDRESS DEPT. PS-5, COUNCIL BLUFFS, IOWA

Formerly Wholesale Radio Laboratories

World Radio LABORATORIES INCORPORATED

# AMAZING MYSTERY BUTTON

Startles Everybody. With this *Electronic Button* you can make your own Telephone–Amplifier–Detectiphone. Attach this button to piece of cardboard—transmit conversation to another room. Music also transmitted to distant places. Most interesting electrical apparatus ever discovered. Enables you to perform hundreds of experiments. So tiny it can be concealed in dozens of places. A Pre-War Product. Electronic Button including 5000 word instruction booklet with 50 illustrated experiments postpaid only $1.00.

**Electronic Products Company, Saint Charles, Ill.**

# EASY TO LEARN CODE

Learn or increase speed with an Instructograph —the Code Teacher that takes the place of an operator-instructor and enables anyone to master code without further assistance. Available tapes from beginners alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready—no QRM. Thousands have "acquired the code" with the Instructograph System. Write today for convenient rental and purchase plans.

**INSTRUCTOGRAPH COMPANY**
**4715 Sheridan Road, Chicago 40, Illinois**

# BLOWERS COOLING HEATING

Cooler supplies. Room coolers. Pads—pad frames. Cooler Pumps. Fan Blades. Gas & Oil conversion burners. Forced air furnaces. Wanted Men to sell and install our conversion burners and furnaces.

**PEERLESS SALES 4318 Sheridan Blvd. LINCOLN 6, NEBR.**

# Kill Dandelions Easily

New Spray Treatment Kills Dandelions and Does Not Kill Grass. Simple, inexpensive, and easy to use. Quick, permanent results. NON-POISONOUS. Rid your lawn of dandelions. Have beautiful green grass. Write Today for Illustrated Booklet. It is FREE — no obligation.

**AMERICAN HOMEGROUNDS INSTITUTE**
**Dept. 17, Columbus, Kans.**

# RHEUMATISM

**ARTHRITIS - NEURITIS - SCIATICA**

Why continue to suffer the agonizing pains of these diseases when the usual remedies have failed? Learn about a new trustworthy, modern, non-surgical treatment method. This marvelous treatment is completely explained in the Ball Clinic's FREE Book. Write today. No obligation.

**BALL CLINIC, Dept. 5100, Excelsior Springs, Mo.**

*New Designs in*

# FRANZITE GRIPS

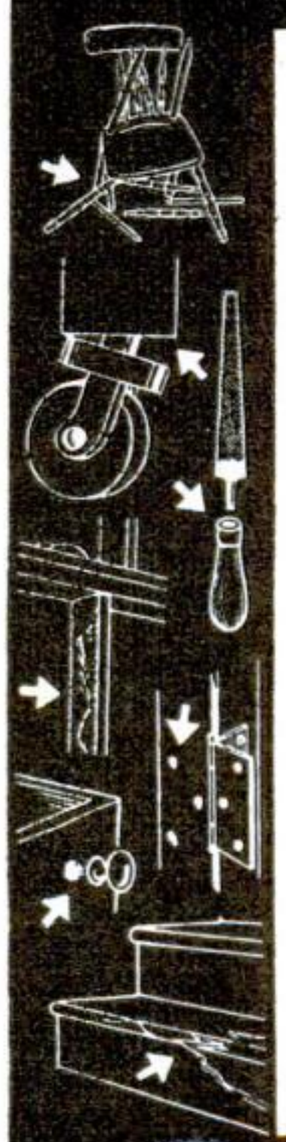
**Modernize Your Gun! Improve Your Score!**

Most durable grips made. Positively unbreakable! For Colt, Smith & Wesson, Hi-Standard. Ortgies, Luger & Mausers in a wide choice of beautiful designs in ivory, pearl, walnut, onyx, etc. Low prices. FREE CATALOG. Dealers Wanted.

**SPORTS, INC., (Mfrs.) 5501 Broadway, Dept. S-5, Chicago 40, Ill.**


Say You Saw It In Popular Science


# Quick, Easy, Lasting REPAIRS!



Cracks, holes, dents in wood, plaster, concrete, metal, etc. — loose handles, rungs, knobs, screws — mistakes in carpentry, etc. — fix them *all* with Savogran Crack Filler (hard as stone) or Savogran Wood Putty (easily tooled). Just mix with water, press into place. Stays put, hardens quickly, will not shrink! Can be painted pre-colored. Ideal for models, inlays, etc. Patented! Big 1-lb. can only 30c at hardware and paint stores.

**FREE CIRCULAR**

Describes these and other Savogran Products: Heavy Duty Cleaner, Remover & Bleacher (renews floors), Paint Brush Cleaner, Strypeeze (removes all finishes), Coldfoam Soapless Soap Powder.

**THE SAVOGRAN CO.**
Dept. 31, Boston 10, Mass.

# SAVOGRAN

Reg. U.S. Pat. Off.

**CRACK FILLER • WOOD PUTTY**

*IN EVERY WELL-EQUIPPED HOME WORKSHOP*




Copyrighted material

# "YANKEE" TOOLS

## also make friends

Vast throngs of new shop workers, trained in war industries, used "Yankee" Tools for the first time . . . mastering fresh trade skills which will stand them in good stead in the vital production period ahead. They learned what skilled mechanics have long known . . . that "Yankee" Tools complete innumerable tasks *faster*, *easier*, and *better*.

**"YANKEE" SPIRAL SCREW DRIVER No. 130A**
A Size for Every Purpose

**"YANKEE" TOOLS**
*make good mechanics better*
**North Bros. Mfg. Co., Phila. 33, U.S.A.**
**Established 1880**

***Makers, also, of "Yankee-Handyman" Tools***

# WINDOW SIGN LETTERS

For Store Fronts and Office Windows. Anyone can put them on. Samples furnished. Genuine gold and silver.
**METALLIC LETTER CO., 441 N. Clark, Chicago 10**

# BUILD IT YOURSELF!

**Complete 30 Watt Amplifier Set** with all the necessary parts including tubes (less speaker), chassis, etc. with large pictorial print. **Only $18.95**
Send stamp for giant catalog.
**UNITED RADIO CO., 58-A Market St., Newark 1, N. J.**

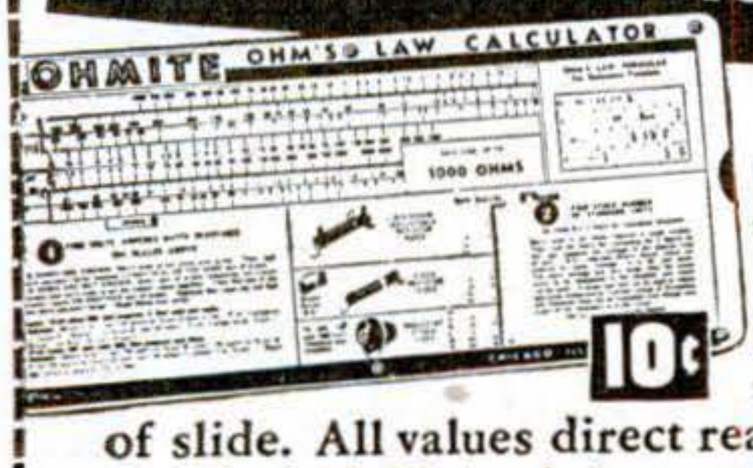
# BE A REAL COWBOY

Just out—the very latest in guitars. Your choice of a Spanish or Hawaiian guitar for only $9.90. FREE—with each guitar you will receive picks, neck cord and an easy to learn instruction book. Money order or check. Delivery charges prepaid. **Jack's Music Studio, Dept. PS-2, 204 N. 7th St., Allentown, Pa.**

# DO YOU

**WANT a permanent business profession of your own? Then become a foot correctionist.** Earnings of men and women in this greatly needed profession run as high as $50.-$100. weekly after a few weeks home training —not medical or chiropody—easy terms, no further capital needed, no goods to buy. 51st year. Write for free booklet.
**Stephenson System of Foot Correction, 62 Back Bay, Boston, Mass.**

**SEND FOR THIS TIME SAVING OHMITE Ohm's Law Calculator**




**Figures Ohms, Watts, Amperes Volts . . . Quickly!**
Any Ohm's Law Problem solved with one setting of slide. All values direct reading. (4⅛"x9")
**Send only 10c in coin to cover cost of handling.**
**OHMITE MFG. CO., 4944 Flournoy St., Chicago 44, Ill.**

*Stationary Electric Drive*

**BIG PROFITS FROM YOUR SHOP**
It's easy to establish your own arc welding job shop and make it pay big dividends! All kinds of automotive, farm and factory arc welding repair work will come to you. Arc welding is one of today's **most highly paid businesses—and now's the time to get into it.**

**EASIER WELDING WITH HOBART**
Construction and operation features found only in Hobart Arc Welders let you do a better job of arc welding in less time with a minimum of work. 1000 combinations of welding heat, remote control at the work are good reasons why experienced welders prefer Hobart.

**CHOOSE THE RIGHT WELDER**
In Hobart's complete line you'll find Electric Drive Portable and Stationary; Gasoline Drive; A. C. Arc Welder; Generator Only — in a size and range that fits your requirements. Use the coupon for details.

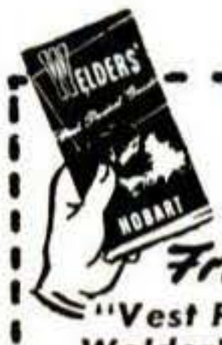
**HOBART BROS. CO., Box P-56**
**Troy, Ohio.** *"One of the World's Largest Builders of Arc Welders."*

*Electric Drive*
**Portable**

*A.C. Arc Welder*

**Save $150 to $300, *"Build Your Own"* HOBART ARC WELDER.**
With this Hobart Generator and used auto parts, it's easy to build-your-own gas drive welder.

*Reach for Your Scissors*




☐ *Free!* *"Vest Pocket Welder's Guide"*

**HOBART BROS. CO., Box P-56, TROY, OHIO**

I'm interested in Hobart Arc Welders. Tell me what they can do for me — send details on items checked:
☐ Electric Drive ☐ A.C. Arc Welder
☐ Gasoline Drive ☐ Generator Only

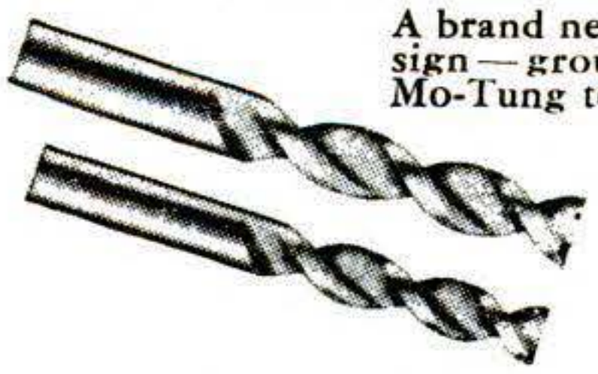
NAME _____
STREET _____
CITY _____ STATE _____



Copyrighted material

## *Announcing* . . . New Style Hi-Speed Router & Round End Mortising Bits

### BARRON SPIRAL FLUTE ROUTER BITS



A brand new double spiral fluted design—ground from finest hi-speed Mo-Tung tool steel—with special radial shaped flutes for faster, smoother, easier routing, grooving, carving, and round-end mortising. Insures true, straight walls and smooth bottom surfaces. Extra long cutting flutes for deeper operations. The router bit that's different—AND BETTER. 1/8"—$1.10, 3/16"—$1.40. Set of 6 sizes up to 1/2"—$8.50 shipped prepaid.

### THE BARRON ROTARY SURFACE SANDER

$5.95 COMPLETE

*Note these Special Features*—Made of Alcoaluminum. Machined and balanced for smooth operation in drill press chuck. For surface sanding woods, plastics or polishing metal surfaces. Complete with 20 instantly removable sanding cup discs. No messy glueing needed. Leaves an agate smooth, absolutely true surface finish. Does not leave waves, ripples, steps or striations in work piece. The only tool of its kind. Shipped prepaid on 10 DAY MONEY BACK GUARANTEE for $5.95.

### The IMPROVED Barron Multi-Purpose Drill Press Planer .. $7.50

Not only surface planes toughest woods and plastics to precision limits—but rabbets, routs, tenons, panels, grooves, beads. Will cut rabbets, tenons, panels, etc. to a depth of 1" with special Barron extra long hi-speed cutter blades. Thousands now in use. Made of Alcoa aluminum, machine finished thru-out. Vibrationless. Fits any drill press. Shipped prepaid on 10 DAY MONEY BACK GUARANTEE on receipt of cash, money order or C.O.D. for $7.50.

### Barron ALL-METAL Auxiliary DRILL PRESS Table .. $8.85

Hard Alcoa aluminum die casting heavily ribbed—machined both sides. Has 234 sq. inch extra large working surface. Equipped with Barron Steel Planer Fence. Can also be used for shaper operations, innumerable other drill press uses. A real buy at $8.85, express collect.

*See Your DEALER . . . Or Write For CATALOG*

**BARRON TOOL CO., INCORPORATED**
**370 Architects Bldg.: Detroit 1, Mich.**

**BARRON PRECISION WORK SHOP TOOLS**

---

## GET INTO PLASTICS

### FREE BOOK ON *PLASTICS*

Answers your "Plastic" Questions. Flexible Molds. Liquid Marble. Plastic Flooring. A guide to Money Making Opportunities. Tells you how to start. Questions and Answers. If you're interested in this new field write now!

**FREE BOOKLET** *Send For It Today!*

Act now! Get started while the field is not crowded. Dont' delay!

**BING PRODUCTS** Dept. B5, 88 Broad Street Boston 10, Mass.

---

## CIGARETTES

ALL POPULAR BRANDS

**$1.35 PER CARTON** — NO OTHER COSTS

*Minimum order 3 cartons*

*Perfect delivery guaranteed*
Send check or money order to
**ACE MAIL ORDER CO.**
East Orange 21, N. J.

---

### *THE GEM MAKER*

Amateurs or professionals . . . hobbyists or jewelers . . . Polish your own gems with a B&I Gem Maker. You will find this a profitable adventure. All necessary lapidary equipment is furnished, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing, also complete instructions. The complete equipment as shown, less motor and belt, for only $29.50, f.o.b., Burlington, Wis. Write today for information and literature on the Gem Maker and accessories.
**B&I MFG. CO., Dept. M, Burlington, Wis.**

---

### LAWN ORNAMENT-NOVELTY PATTERNS

28 Lawn Ornament Patterns, 25c. Other patterns; 15-20" high; Dutch Girl, Dutch Boy, Pirate, Bull Terrier, Mexican Girl, Mexican Boy, Dwarf, Penguin, Flower Girl, 10c each. 25 Novelty Patterns, 30c. **All 62 Full Size Patterns, $1.00 Postpaid.** Strother Pattern Service, Dept. 7-C, Box 383, Belington, W. Va.

---

### EYE-GLASSES BY MAIL

**16 Days Trial**

**Write Today for Free Catalog. Send no Money**
**ADVANCE SPECTACLE COMPANY**
**537 South Dearborn Street, Dept. SP-5, Chicago, Illinois**

---

### MEN-WOMEN

A real profitable and enjoyable way to earn money—Music while you work. Sell, MUSICAL NOVELTY BOXES—with genuine imported swiss musical unit, completely installed in BEAUTIFUL plastic pianos, powder boxes, cigarette boxes, and various other items ready to play. Territories open to livewire salesmen and women. Write for particulars NOW, giving some information about yourself.
**ASSEMBLY & REPAIR CO., 582 Third Ave., Dept. P.S., New York 16, N. Y.**

---

### CARBIDE SCRIBER NON-MAGNETIC

FOR HARDEST STEEL, GLASS, ETC.

Tungsten Carbide — the hardest metal made by man — carefully ground on diamond laps, brazed into stainless steel 6" handle for marking steel and other metals — for etching, marking, cutting glass. Cuts all directions. Easy to follow any contour. In plastic case with pocket clip.

PRICE POSTPAID **$2.00**

Dealers Wanted

**LUCAS-MILHAUPT ENGINEERING COMPANY** 5049 S. LAKE DRIVE CUDAHY, WISCONSIN



Copyrighted material

# SALESMEN FOR CITY AND COUNTY

*Nationally Known Manufacturer*

Build up a **business of your own** with Nationally Advertised Products bearing Underwriters' label. Sell to schools, factories, service stations, warehouses, hotels, restaurants, public institutions, truck and bus companies, grain elevators, house trailers, autos, farms, homes, etc. **Capable man can earn real money.** Established in 1916. *Write letter with details, age, experience, etc.*

**THE FYR-FYTER CO.,**
Dept. 92-17, Dayton 1, Ohio

## MASTER CHAMPION
## LAWN MOWER SHARPENER

Also Mfg., Saw Sharpening & Key Machines

**FRANK'S MFG. CO.**
LUcas 6929, 3312 Tweedy Bl.
SOUTHGATE, CALIF., U.S.A.

*Fix Your Own* — — — —

# ALARM CLOCKS

**New, practical home course. Just out. Makes interesting hobby—profitable too. Save money by doing your own repairing at home. Easy if you know how. Price now only $1.00. Details FREE. Send postcard.**

**THIES JEWELRY STORE, Genoa 5, Illinois**

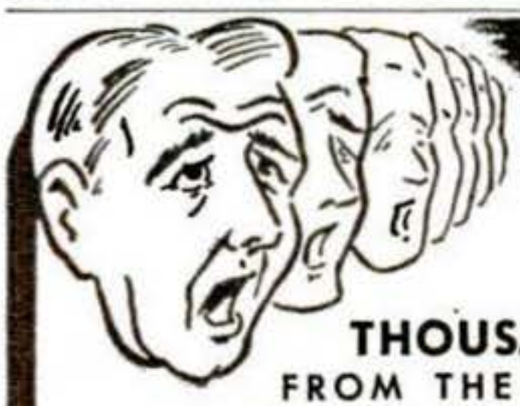
## CAPE COD CHAIRS
## TRELLISES
### ARBORS FENCE PICKETS

**Chairs styles B-C-A Plans 50c ea. All 3 only $1.00**

**12 different trellis designs Plans of all 12 only 50c**

Beautiful 31-family Mt. Vernon martin house. Large, fully detailed plan $1.00. Four fine lawn figure patterns: Dutch Boy, Tulip Girl, Holland Pair and Sunbonnet Girl—all four patterns only $1.00. Send 10c for beautiful catalog illustrating many fine home and garden projects, plans, knockdown kits and completed projects.

**CRAFTSMAN'S MODEL CO.** Dept. K-5, 2030 No. 41st St. Milwaukee 8, Wis.



# BREATHEASY
## IS GIVING RELIEF TO THOUSANDS OF SUFFERERS
FROM THE SYMPTOMS OF
# ASTHMA
OF NON-CARDIAC NATURE
# AND HAY FEVER
## THE MODERN INHALANT METHOD
SOLD ON MONEY-BACK GUARANTEE

* CAUTION: Read literature thoroughly and use only as directed.

Write For Information Today!

# BREATHEASY

*Write to—* **Dept. PS**
**BREATHEASY DISTRIBUTORS, INC.**
**65 Cedar Street Seattle 1, Wash.**

# WAR BARGAINS in LENSES and PRISMS

## NOW! MAKE YOUR OWN BINOCULARS!

**Complete Set of LENSES and PRISMS from Navy's 7 x 50 Model**

**Save up to $150.00!**

Here's an unusual opportunity to secure a fine set of Binoculars at a tremendous saving of money. Build them yourself with all of the very same optics contained in the Navy's 7 Power Glasses. Or you can construct a Monocular (½ a Binocular) in which case exactly one half quantities of the Binocular Components will be furnished. All Lenses and Prisms are in near perfect condition. Lenses are cemented. Complete assembly directions included for either project.

**Stock #5102-N** Near Perfect Binocular Set . . **$25.00 Postpaid**
**Stock #5103-N** Near Perfect Monocular Set . **$12.50 Postpaid**

*We now have some of the Metal Parts and Bodies for Navy's 7 X 50 Binoculars. Complete details sent with all orders for above sets or upon request.*

**35 MM KODACHROME PROJECTING LENS SET**—Consists of Achromatic Lens for projecting, plus a Condensing Lens and piece of Heat Absorbing Glass with directions.
**Stock #4025-N** . . . . . **$1.95 Postpaid**

**ALL THE LENSES YOU NEED TO MAKE YOUR OWN TELESCOPE! ALL ARE ACHROMATIC LENSES**

**GALILEAN TYPE**—Simplest to Make but has Narrow Field of View.
**Stock #5018-N** 4 Power Telescope . . . . . **$1.25 Postpaid**
**Stock #5004-N** Small 2 Power Pocket Scope . **$1.00 Postpaid**

**PRISM TELESCOPES**—Uses Prism instead of Lenses to Erect Image. Have wide field of view.
**Stock #5012-N** 20 Power Telescope . . . . . **$7.25 Postpaid**

**"OUR ADVERTISING SPECIAL"**—15 lenses, plus 10-page Idea Booklet. Make your own telescope, microscope, magnifier, drawing projector, Kodachrome viewer; use for experimental optics, copying, ultra close-up shots, etc. Many uses.
**Stock #1-N** . . . . . **$1.60 Postpaid**

**NEW 50-PAGE IDEA BOOK "FUN WITH CHIPPED EDGE LENSES."** Contains wide variety of projects and fully covers the fascinating uses of all Lenses in sets listed above—only **$1.00 Postpaid.**

## TANK PRISMS—PLAIN OR SILVERED

90-45-45 deg. 5¾" long, 2⅛" wide, finely ground and polished.
**Stock #3004-N** Silvered Prism (Perfect) . . . . **$2.00 Postpaid**
**Stock #3005-N** Plain Prism (Perfect) . . . . . **$2.00 Postpaid**
**Stock #3100-N** Silvered Prism (Second) . . . . **$1.00 Postpaid**
**Stock #3101-N** Plain Prism (Second) . . . . . **$1.00 Postpaid**
(Illustrated Book on Prisms included FREE)

**MAGNIFIER SET** . . . 5 Magnifying Lenses . . . Powers from 1 to 10. Various diam. for many uses.
**Free Booklet** on Home-made magnifiers included.
**Stock #1026-N** . . . . . **$2.00 Postpaid**

**OPTICS FROM 4-POWER PANORAMIC TELESCOPE**—Excellent condition. Consists of Objective Prism, Dove Prism, Achromatic Objective Lens, Amici Roof Prism, Eye Lens Set (. . . a $60.00 value)
**Stock #5016-N** . . . . . **$6.00 Postpaid**

## MICROSCOPE SETS

Consisting of two Achromatic Lenses and two Convex Eye Piece Lenses which you can use to make a 40 Power Pocket Microscope, or 140 Power Regular Size Microscope. These color corrected Lenses will give you excellent definition.
**Stock #1052-N** . . . . . **$3.00 Postpaid**

Consisting of Prism, Mirror and Condensing Lens. These used together with Stock #1052-N will make an excellent Microprojector enabling you to get screen magnification of 400 to 1000 Power according to screen distance.
**Stock #1038-N** . . . . . **$2.00 Postpaid**

**SPECTROSCOPE SETS** . . . These sets contain all Lenses and Prisms you need to make a Spectroscope plus **FREE** 15-page Instruction Booklet.
**Stock #1500-N** Hand Type Spectroscope . . . . **$3.45 Postpaid**
**Stock #1501-N** Laboratory Type Spectroscope **$6.50 Postpaid**

***We have literally millions of war surplus lenses and prisms for sale at bargain prices. Write for Catalog "N"—Sent Free!***

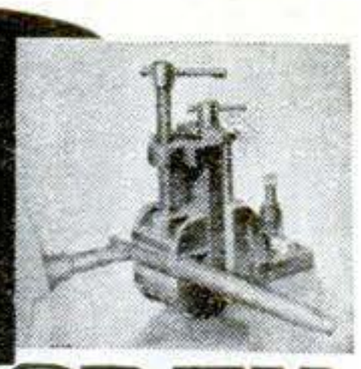
**Satisfaction Guaranteed** — **Order by Stock No.** — **Immediate Delivery**

# EDMUND SALVAGE CO.
## P. O. AUDUBON, NEW JERSEY

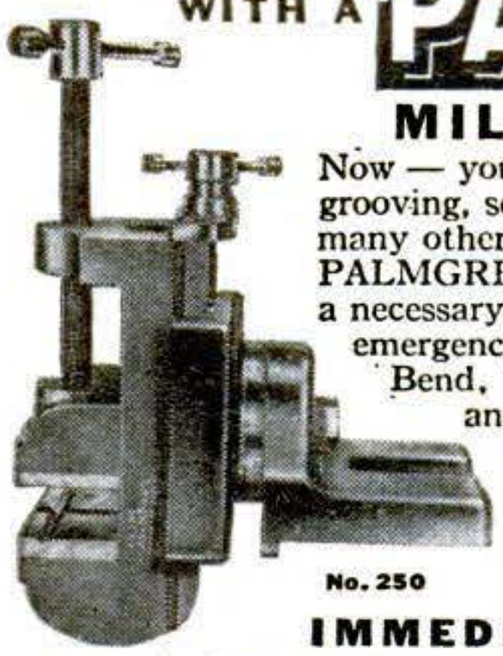


Copyrighted material

# MILL IT ON YOUR LATHE



WITH A **PALMGREN**



No. 250

## MILLING ATTACHMENT

Now — you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes. It has 360° graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

**IMMEDIATE DELIVERY**

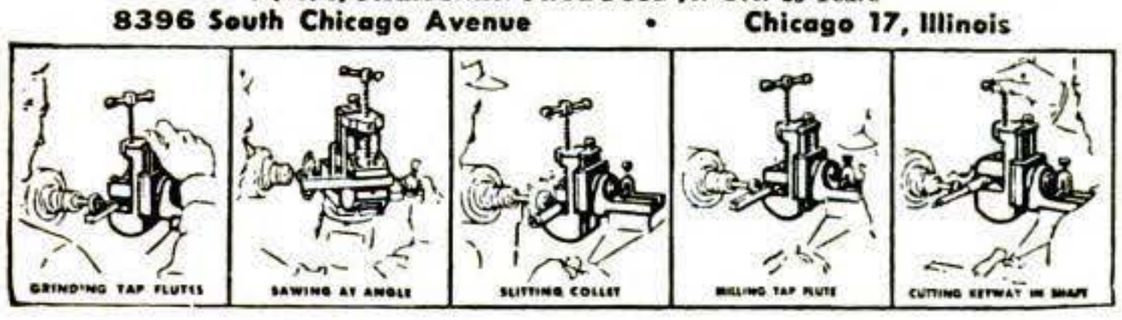
| Nos. | Width Jaws | Depth Jaws | Jaws Open | Weight Pounds | Base Opening | Price F.O.B. Factory |
|---|---|---|---|---|---|---|
| 150 | 1½" | 1" | 1⅝" | 6½ | 1" | $18.75 |
| 250 | 2½" | 1 7/16" | 2½" | 11 | 1¼" | 24.75 |
| 400 | 4" | 1½" | 4" | 25 | 2" | 39.75 |

Order from your dealer or jobber. Write for circular No. 349

**CHICAGO TOOL AND ENGINEERING CO.**

*Mfrs. of PALMGREN PRODUCTS for Over 28 Years*

8396 South Chicago Avenue • Chicago 17, Illinois




# HANDY FURNITURE KIT

*Fixes Scratches, Dents, Nicks*

You can easily restore beauty to damaged wood surfaces with this new practical kit. Enables anyone to do fast, easy touch-up jobs like a professional cabinet finisher. Repairs holes, burns, gouges, scuff marks, etc. Complete outfit—pays for itself over and over.

**Amazing Results—Easy to Use**

Kit includes 23 different items—scratch removers for slight scratches, assorted shades of shellac sticks for deep nicks, bottles of light and dark stains, shading lacquer, alcohol lamp with fuel, stainless steel spatula, touch-up brushes, scratch sticks, steel wool, sandpaper, rubbing liquid. Packed in handy leatherette finish case. Send for it today. Best investment of lifetime. Fully guaranteed. **Detailed instructions supplied.**

**$3.95 Postpaid**

**AMERICAN HOUSEHOLD BUREAU**
**Dept. A, 520 N. Michigan Ave., Chicago 11, Ill.**

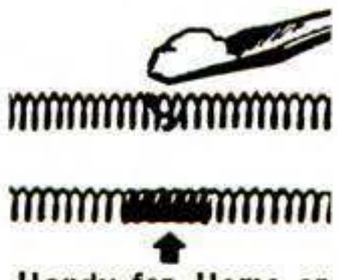
*Make Your Own*
# RUBBER MOLDS

*with*
**RED LATEX MOLDING COMPOUND**

Earn money, have fun; make your own molds for plater objects. Produce novelties and gifts for home and to sell to friends. RED LATEX MOLDING COMPOUND (60% density) now available in quart and gallon quantities. Gives perfect results, easy to apply. Send for complete information and prices. **OHIO SUPPLY CO., Dept. E3, 474 Lilly Ave., Columbus 5, Ohio.**

**REPAIR YOUR OWN ELECTRIC APPLIANCES**

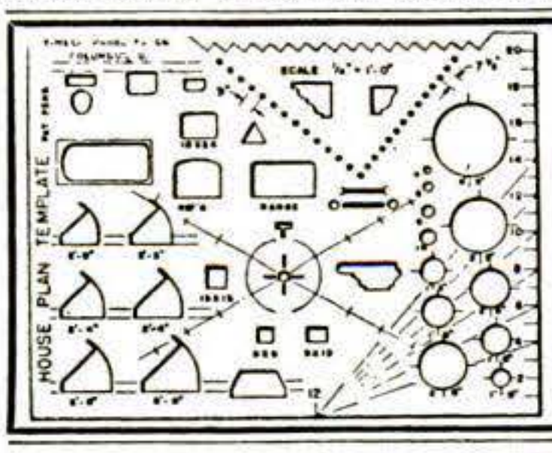
# WITH NEW AMAZING NICHROCITE



Handy for Home or Industrial Use

Simply overlap ends, apply Nichrocite paste and turn on the current—a perfect weld results. Used by big utility companies and repair shops. Just the thing for that broken or burned out heating element in your electric iron, stove, toaster or heater. Does the job in a jiffy. Trial order, $1; 4 ozs. $2.50; 1 lb. $8.00.

**ARMSTRONG ELECTRIC COMPANY, Box 861-PS, Minneapolis, Minn.**



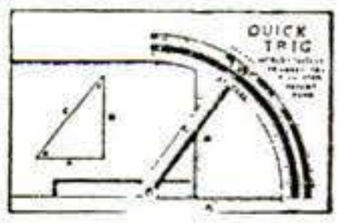

# HOUSE PLAN TEMPLATE

**Made of clear sheet plastic, with accurate cut-outs for drawing door-swings, plumbing and electric fixtures, fireplace, stairs, moldings, roof-pitch, etc. Standard ¼" = 1'-0" scale.**

**$1.50 POSTPAID**

**TIMELY PRODUCTS CO.**
**Box 206E, Columbus 9, Ohio**

# TRIG SLIDE RULE




Patent Pending

## EASY TO USE

● Fits the pocket. Quickly solves trigonometry, radio, and electricity problems. Simply set the slides and read the answers for all three sides and angles of a triangle. Gives degrees, sines, cosines, and tangents of angles Entirely automatic Easy instructions included FREE. Price only $1.00 or we will mail C.O.D. plus postage. Resale and wholesale orders taken.

**REED MFG. CO., 124-B W. 4th St., Los Angeles 13, Calif.**

*"The Book They're Talking About"*
**Contains over 350 illustrations, charts and notes**

# ART ANATOMY OF THE HUMAN FIGURE

For the Amateur and Professional Artist and Sculptor. Giving detailed study of every part of the Male and Female body. Posed and in rhythm.

Outside U.S.A. send $1.25

**ONLY $1.00**

**MAJOR BOOK CO., Dept. 6014-D, FOREST HILLS, NEW YORK**

# SIGNS AND SHOWCARDS

**EASILY AND EXPERTLY PAINTED WITH LETTER PATTERNS**

MANY SIZES & STYLES, WRITE FOR FOLDER!

**JOHN F. RAHN**
1330-33 N. CENTRAL AVE.
CHICAGO 51, ILL.

# Try One . . . FREE!

**SMOKES LIKE MAGIC. NEW, 6 in 1 CIG-SMOKER.** Scientific design for **SAFE—CLEAN—FILTERED—** cigarette smoking. The cig **BURNS INSIDE** this miracle, durable **SILVERGLAS** creation. It combines a holder—filter—fire shield—ash guard—smoke cooler and automatic snuffer. **PREVENTS** fires, burns, ash mess, accidents, irritating harmful smokes. It's wind and rain proof. Nothing else like it. Sample Cig-Smoker, with 100 filters. Prepaid, **$1.00.** One extra Cig-Smoker free if you include dealer's name. A guaranteed product.

**Agents, Dealers, Exporters, ask for sales data.**

**Pat. & Mfr.—Safe-Gard Mfg. Co.**
**22 Perry—Payne Bldg. Cleveland 13, Ohio**

# WORLD'S LOWEST PRICED ADDING MACHINE

**VEST POCKET SIZE**

## IDEAL FOR BUSINESS OR PERSONAL USE

**FREE TRIAL**
**ONLY $2.50 TOTAL COST**
**SEND NO MONEY**

**Each Baby Calculator in Beautiful, rich-looking Leatherette case—at no extra cost. FREE!!**

Fits vest pocket or purse. Guaranteed accurate. Operated as easily, and as reliable, as machines costing many times as much. Not a toy. Substantially made of 28-gauge steel—guaranteed for life against defects in construction. You positively can't buy a calculator of equal quality for as little money. **ACCEPTED AS THE FINEST LOW PRICED CALCULATOR FOR OVER 30 YEARS!** Operates with a flick of your finger. Adds, subtracts, multiplies, divides—counts up to ten million. Pays for itself over and over in mistakes avoided, and time saved. **MAKES IDEAL GIFT.**

Sold on a positive money back guarantee. Send only $2.50. Calculator sent postpaid, or send name and address and pay postman $2.50 plus postage. **MONEY BACK IN 10 DAYS IF NOT DELIGHTED!** (If outside U. S., send $3.00.) **AGENTS WANTED.**

**CALCULATOR MACHINE CO., (Mfrs.)**
**Dept. 466, P.O. BOX 248, GLENVIEW, ILLINOIS**



Copyrighted material

# PREVENT WASHDAY MISHAPS with TITE-LINE Clothes Line Holders

String your clothes line on TITE LINE clothes line holders. It's quick. It's easy. It's the surest way to prevent that exasperating washday disaster—broken clothes lines. Each section is securely gripped—a line break affects only one section.

**EASILY INSTALLED ON FLAT OR ROUND SURFACES**

TITE-LINE clothes line holders are used in attics, basements, outdoors — wherever clothes line is used. Saves line, saves time, prevents knots and kinks, holds line tight, no tieing. Get TITE-LINE at your favorite hardware or variety store. If not in stock, send us your dealer's name.

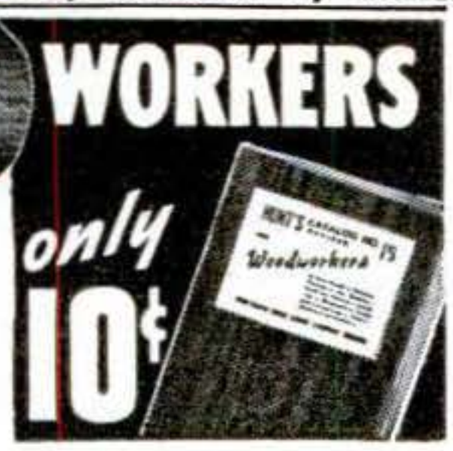
THE MIDLAND COMPANY
SOUTH MILWAUKEE, WISCONSIN

# PICNIC STOVE
## and TRASH BURNER

Looks like tree stump—made of durable reinforced Haydite concrete colored in natural gray or brown—complete with grill, charcoal pan and grate. Beautify your yard—satisfaction guaranteed. Use as trash burner—safe in wind—Will not harm grass, trees, etc. Only $29.45—Freight prepaid east of Rockies. For free descriptive circular write to:

**W. O. JOHNSON CO., Dept. PS-4, Omaha 6, Neb.**

# WOOD WORKERS




**Lumber—Plywood Available**

Harold Hunt wants to send you big new No. 15 Catalog. Over 124 pages of woodworking ideas. 12 pages of rare woods in colors. UNEQUALED BARGAINS in imported and American woods, supplies, hard-to-find hardware. Send only 10c to cover postage and handling.

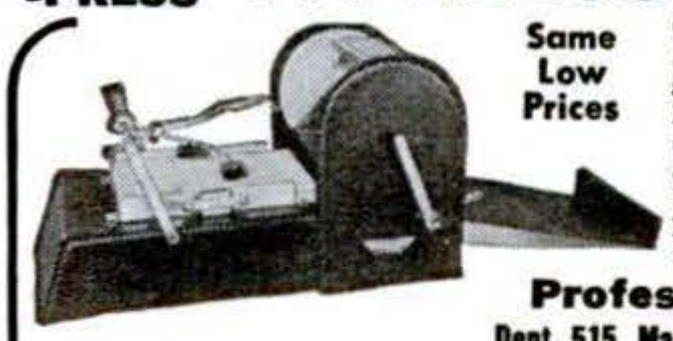
CRAFTSMAN WOOD SERVICE CO.
2729 S. Mary St., Dept. B-69, Chicago 8, Ill.

# WET BASEMENTS

Start your own waterproofing business with Seal Seep. New—patented. Seals from inside. Easy to apply. *Guaranteed.* Big Profits—exclusive territory. Free offer.

**SEAL SEEP CO., 515 Dawson Road, Cincinnati 27, Ohio**

# PRINT-O-PRESS TYPELESS PRINTERS



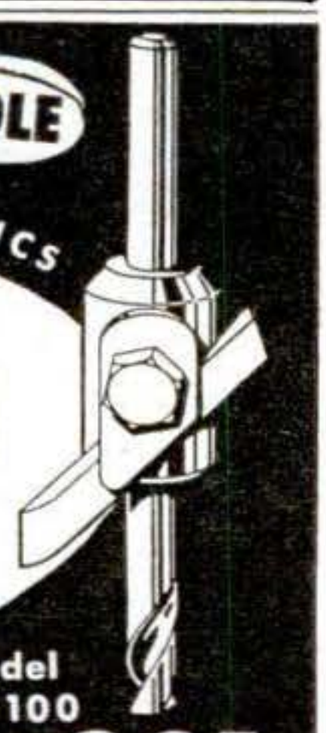
Same Low Prices

These stencil duplicators available again at lowest pre-war prices. Letter, legal or postcard sizes. Hand or automatic feed. Also lowest prices on supplies. Send for samples of work.

**Professional Products**
Dept. 515, Madisonville, Cincinnati 27, Ohio

# CUT ANY SIZE HOLE

IN METAL · WOOD · PLASTICS



Bruno Adjustable Hole Cutter for home users, mechanics, farmers, technicians! High speed steel blade cuts clean holes quickly. Fits drill press, portable drill or hand brace. Money back guarantee! At all hardware stores or write direct, Dept. PS-4

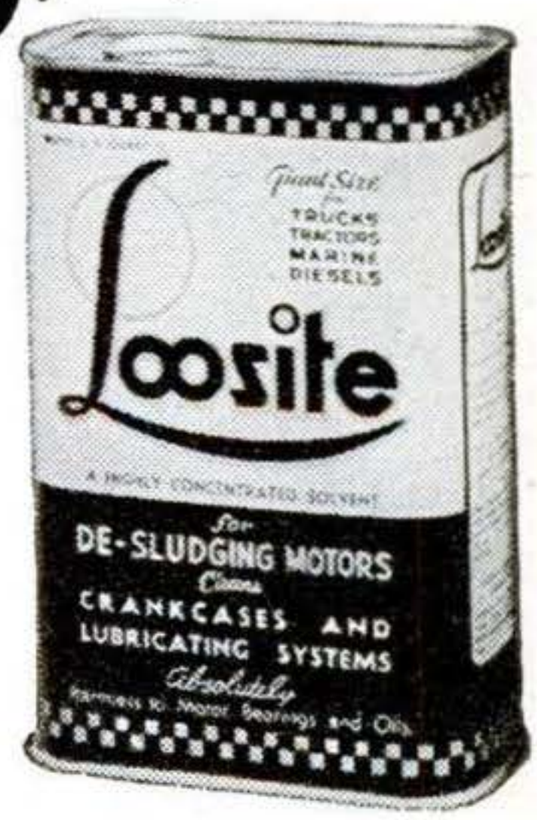
| Model No. | Shank Size | Cutter Expansion Capacity | User's Price |
|---|---|---|---|
| 100 | ¼" straight shank | ⅝"-1½" | $2.95 |
| 100-B | Square Bit Stock | ⅝"-1½" | $2.95 |
| 101 | ⅜" straight shank | 1"-2½" | $4.95 |
| 101-B | Square Bit Stock | 1"-2½" | $4.95 |

Model No. 100 $2.95

BRUNO TOOLS
BEVERLY HILLS, CALIFORNIA

## SLUDGE

- fouls spark plugs
- gums up rings
- sticks valves
- retards all working parts
- causes hard starting
- cuts down power
- shortens engine life




## LOOSITE

- CLEANS OUT SLUDGE

## SILOO

- KEEPS OUT SLUDGE

A quick, safe, economical Loosite-Siloo treatment will show immediate results on any make and model car regardless of quality or brand of oil used. Fifteen years of service endorses its use.

***GET IT FROM YOUR DEALER OR SERVICE STATION TODAY***

SOLVENTS FOR ALL TYPES OF PETROLEUM RESIDUES

# Petroleum Solvents CORPORATION

General Offices: 331 Madison Avenue, New York 17, N. Y.
Plant and Laboratories: Port Reading, New Jersey
Petroleum Solvents Corp. of Canada, Ltd.,
Dominion Square Bldg., Montreal

If you heat with oil — write for information on
**SILOO FUEL OIL TANK SOLVENT**



Copyrighted material

# YOU NEED THESE CRAFTSMAN'S TOOLS

## SUPER DRILL GRINDER

Sharpens round shank drills from 3/32" to 1 1/16" diameter. Grinds Old Drills like new in 4 different drill point angles. Grinds Short, Medium and Long Twist Drills from 1½" up to 11" long, for hand or power grinding wheels.

**100,000 IN USE!**

Grinds your drills like factory in 25 seconds. Gives perfect center and clearance. Saves drills, time and money. No shop should be without the Super Drill Grinder. Guaranteed to do the work or money back. The Grinder that gives a round point!

Only **$2.95**

## SUPER ARBOR

(PATENT PENDING)

A combination drilling or grinding wheel attachment. For ½" motor shafts. Will take grinding wheel with 1" hole on shaft and ½" hole on small end. Extension can be used for rag or wire wheel, or ½", 24-thread drill chuck which holds drills from No. 60 to ½" in diameter. Right hand thread only.

Price Only **$1.50**

## SUPER HACKSAW AND FLAT DIE FILE HOLDER

The tool with 100 uses! Holds broken hacksaw blades—used by mechanics, electricians, plumbers, auto mechanics, hobbyists and repairmen. Perfect for all-'round household needs; ideal for difficult close-quarter work. Nothing like it for tool and die men. Price, without saw blade.

Only **95c**

**At your dealers or postpaid**

**Crandall Mfg. Company**
**1512 West Slauson, Dept. FB-5**
**Los Angeles 44, California**

---

## THE HEAVYWEIGHT OF BENCH MILLS

**BEEFED UP FOR PRODUCTION—PRICED LOW FOR HOME SHOPS**

# Diamond
**MODEL B-12**

DIAMOND MODEL B-12, sturdiest, heaviest bench mill on the market. All engineering refinements for high precision and long life. Taper roller spindle bearings, 6 spindle speeds (100 to 400 r.p.m.), large hand-scraped vee ways. Table travel 12" longitudinal. Table surface 5⅛"x20". Price only $372.00, f.o.b. Los Angeles, less motor. Full line of accessories Free Folder!

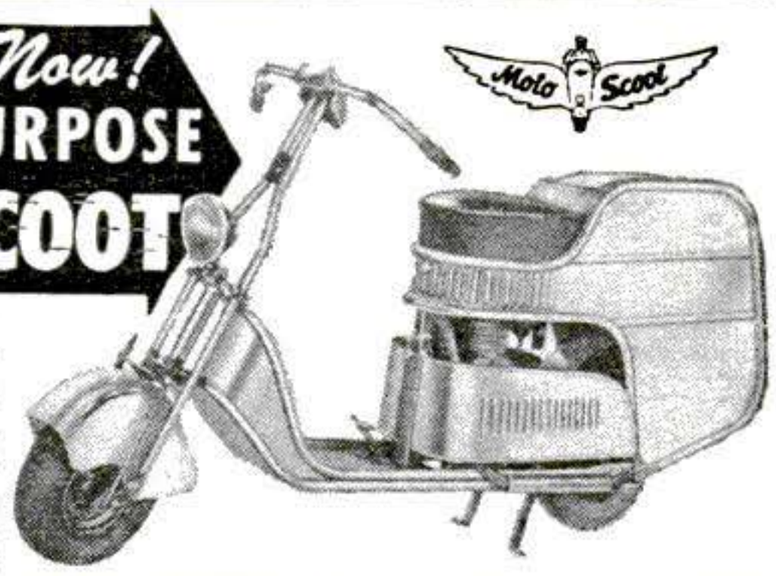
**DIAMOND MACHINE TOOL CO.**
**Dept. 1, 3429 E. Olympic Blvd., Los Angeles 23, Cal.**

DIAMOND DTCo

**Manufacturers of the DIAMOND Line of Precision Milling Machines and Accessories**

---

# *Available Now!*
# New ALL-PURPOSE MOTO-SCOOT




We are now making deliveries on MOTO-SCOOTS. Amazing new improved MOTO-SCOOT world's most economical form of motorized travel—**up to 80 miles per gallon!** Completely enclosed package compartment. Both **"Solo"** and **"Delivery"** Models ideal for utility and sport. To assure prompt delivery place your order at once. To obtain colorful illustrated booklet, giving full details, write us today. Be sure to state your **complete** address including county.

**AMERICAN MOTO-SCOOT CO., Dept. 5PS**
**1305-23 W. Carroll Ave., Chicago 7, Ill.**

---

***Send for our Catalog of***
**TOOLS & EQUIPMENT *for* DEVELOPMENT WORK · WATCHMAKERS TOOLS···**

**CATALOGUE**

**of Precision Tools, Equipment for Development Work, for the making of New Worlds. — When requesting catalog state nature of your business.**

**"Mail Orders Only"**

**HENRY PAULSON & CO. CHICAGO 3, U.S.A.**

---

# *New! Instant Drying Speedry Brushpen*

**Lightweight aluminum Brushpen solves all your marking problems**

***The pen of "101 uses" for every home and office.***

Pen, Ink, Dropper—Set comes complete. Postpaid. **$2.50**

**Amazing new method marks, letters, and writes, on all surfaces!**

- **Addressing**
- **Sketching**
- **Showcards**
- **Charting**
- **Layouts**
- **Posters**

Easy to fill. Leakproof! Marks all fabrics, glass, metal, etc. Indelible ink won't corrode, won't run! Useful! Entirely dependable!

**Send check or money order to**
**UTILITY STORES, 117 S. Wabash**
**Dept. EE17** **Chicago 3, Illinois**

---

# SALESMEN WANTED

***SELL DIRECT TO STORES * BIG COMMISSIONS***

Every dealer in your territory is a prospect for this fast selling specialty. Gov't surplus Gas Masks sell like wildfire for use as toys. Thousands already sold —reorders every day. Big commissions assure big earnings. Two sample Masks and Selling Kit $1.00. Kit alone FREE. Write today.

**STARK'S, 509 S. State St., Dept. X2, Chicago 5, Ill.**

---

# So You Think You're Living?

Yes, you're going through the motion, all right—eating, sleeping, working and all that. But are you really LIVING? And how do you KNOW you are living? To find out read "Life Unlimited," a message for immortals. Your copy mailed free on request.

**LIFE UNLIMITED, Dept. PS-5**
**3227 Indiana Ave.** **St. Louis 18, Mo.**

---

# ANALYZE HANDWRITING

Qualify for Certified Grapho-Analyst Degree. New uncrowded, fascinating field of service. Gratifying earnings reported by graduates in Employment, Credit, Social Service, Police and Judicial, and Entertainment fields. Others have developed profitable private practice, full or spare time, as Personal Problem and Vocational Counselors. Send for 3000 word test lesson and Grapho-Analyst FREE.

**FREE**

**ADDRESS A. I. G. A. Inc. 126 NOEL, MO.**

Copyrighted material

# AUTOPLANE

***New — Streamlined — Low Cost***
***Airplane Type Control — Automatic Clutch***

**BUILD IT YOURSELF!**

Speed—15 to 50 MPH depending on motor size. Over 10 feet long. Most parts standard and available at any accessory store. You will be amazed at low cost and simplicity of constructing one of these cars from our detailed plans. Finished product can look like factory job.

**Elaborately detailed booklet containing photos, numerous drawings and materials itemized postpaid $2.00**

**AUTOPLANE DISTRIBUTORS, MANSFIELD, OHIO**

# BUILD YOUR OWN GALVANOMETER

Locates short circuits, electrical trouble in all household appliances and traces electrical circuits immediately. Also checks and tests radio tubes, etc.

Complete kit for building your own Galvanometer, including 94-page book with instructions and list of parts in kit; how to assemble the meter and explanation of fundamentals of electricity, magnetism, electric motors, generators, wiring circuits, transformers and vacuum tubes.

**$1.48**
**POSTAGE EXTRA**

Excellent for the home workshop. No home should be without one. Order your Galvanometer kit with instruction book now! Money refunded if not completely satisfied. Send check or money order, no COD's, direct to

**GOL-DON SPECIALTIES** 5712 OSAGE AVENUE PHILADELPHIA 43, PENNA.

# *MEN*—Amazing Profits

**from Fast Selling Side Line**

It's New!—It's Different!—It's a carded item that's easy to carry and easier to sell!—Mullens' Invisible Soap Tray! It keeps soap dry & clean—easy to use. No soap tray is needed, just stick this amazing item to a bar of soap and it does the rest.

You'll find every housewife buys one or more cards, at 25c per card, you get a 100% profit. Don't Delay. This sensational seller will be a profitable addition to your selling line. ACT NOW! Send for sample and information!

**Victory Products Co., 1015 Main St., Dept. PS-5, Evansville 8, Ind.**

# *It's FUN to do* MAGIC

Amaze—Mystify—Entertain. Be popular. Enjoy this fascinating hobby. Only 10c brings you our famous Catalog No. 25 of 500 tricks containing the latest in magic for pocket, parlor, stage. Over 25 years in business. We ship everywhere. Send 10c today.

**DOUGLAS MAGICLAND,**
**Dept. S, Dallas 1, Texas**

# START HOME MAIL ORDER BUSINESS

Start small—grow big. Amazing new course shows you the way. Write today for full particulars. No obligation.

**BELFORT (Dept. O) Engineering Bldg., Chicago 6, Ill.**

# HIGH SCHOOL AT HOME

Most well-paid positions demand high school training. Without it, or equivalent, you can't advance to the full extent of your abilities in any trade, business or profession. Whatever your age, however you're situated, IT ISN'T NECESSARY TO STRUGGLE UNDER THAT HANDICAP. I.C.S., famous for more than 50 years, enables you to start your own high school in your own home. You're in a class by yourself—study in your spare time—acquire a high school education at astonishingly low cost. Authoritative texts! Rapid Progress! Write today for free booklet.

**INTERNATIONAL CORRESPONDENCE SCHOOLS**
**BOX 7659-L, SCRANTON 9, PENNA.**

Send me full information on the following subject:

.....

*Name*.....*Age*.....

*Home Address*.....

*City*.....*State*.....

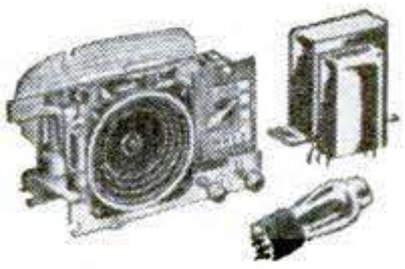
*Present Position*.....*Working Hours*.....*A.M. to*.....*P.M.*

# FREE
*Send for it*
**NOW**

*New* **1946** *Radio Parts and Equipment*

# CATALOG

SERVICEMEN! Dealers! Soundmen! Amateurs! Builders! Here's your handiest, most complete 1946 Buying Guide for Everything in Radio! Features latest sets, parts, equipment of nationally known quality at lowest prices. Assures fastest service from world's largest and most complete stocks under one roof. Expert staff ready to help you.



**NEW RADIO SETS**
**COMPLETE SOUND SYSTEMS**
**LATEST HAM GEAR**
**ALL SERVICE EQUIPMENT**
**BUILDER'S SUPPLIES**
**RADIO BOOKS**

**OVER 10,000 ITEMS**

Everything for every radio use. New model radio sets, phono-radios, recorders, communication receivers, Ham kits, code apparatus, parts, tubes, tools, test instruments, public address equipment and accessories, low-cost easy-to-build kits, diagrams, matched parts lists, leading technical and non-technical books—at lowest prices.

**ALLIED RADIO**

**ALLIED RADIO CORP.**
**833 W. Jackson Blvd., Dept 7-E-6**
**Chicago 7, Illinois**

Date.....

☐Rush new FREE 1946 CATALOG

*Name*.....

*Address*.....

*City*.....*Zone*.....*State*.....

Copyrighted material

## Make *sure* you get it!

NEW IMPROVED **G-E** Exposure Meter

Whenever Baby invites a picture — movie or still — make *sure* you get it... with the new, improved G-E Exposure Meter to guide your camera.

New, simplified dials make it easier to use. Lighter. Sturdier. Proved accuracy. Extremely sensitive. See the G-E meter at your photo dealer's. *General Electric, Schenectady 5, N. Y.*

**GENERAL ELECTRIC** 606-165 E

Say You Saw It In Popular Science

"MORE VERSATILE THAN EVER"

**BURGESS vibro-tool**

Trade Mark Reg U-S Pat Off

For tooling on leather, for a host of craft and shop jobs, the Vibro-Tool is unequalled.

Operates by vibration, 120 strokes per sec.; 60 cycles, 110V AC.

**See Your Dealer Today, or Order Direct.**

The Vibro-Tool with engraving needle $7.50, with set of attachments $16.15.

HANDICRAFT DIVISION

**BURGESS BATTERY COMPANY**

176 N. Wabash Ave., Chicago 1, Ill.

# BIG MONEY NOW IN LIQUID MARBLE

**THREE** wonderful new opportunities for your own big money-making business — regardless of your age, sex, or previous experience!

**1. LIQUID MARBLE.** Make beautiful artificial Marble Slabs. Pour from liquid state. Glazed or unglazed. This marble may be mottled, veined, multi-colored or left in original snow-white state. The color is actually a part of the marble! Does not fade or wear away. Liquid Marble is unsurpassed on kitchen or bathroom walls. Easy to make and install.

**2. PLASTIC FLOORING.** May be made in any color or combination of colors. Gives a lifetime of wear. Dustproof, Soundproof, Verminproof. Resilient to the tread. Lay out solid from wall to wall or in pattern design of various shaped blocks.

**3. FLEXIBLE MOLDS.** For plaster casting. Make your own moulds for few cents each. $1.00 in raw materials will make up to $25.00 worth of finished goods. We furnish names of buyers. Write now for FREE information about our **BIG THREE** money-making opportunities! Get in on busy season just starting. Send penny postcard or letter. No obligation.

**COMPO-TEX, Box 786-G, ST. LOUIS 1, MO.**

The handsomest **DISCHARGE RINGS** you ever saw!

**TERRIFIC VALUE!** only **$5** EACH

HEAVY SOLID STERLING SILVER with GOLD FILLED EMBLEM

You'll be proud to wear either one of these smart, rich-looking, distinctive discharge rings of HEAVY SOLID STERLING SILVER with GOLD-FILLED EMBLEM. Measure knuckle with string or paper. Perfect fit guaranteed. ORDER TODAY. Mail check, money order or ask to ship C. O. D. If not delighted, return in 5 days for full refund.

CHOOSE YOURS!

We Pay Tax and Postage.

AETNA JEWELRY CO. • 95 Nassau St., New York 7, N. Y.

**HARMONICAS**

Key of C

**$1.50, $2, $2.90**

Free Instruction book incl.

**Order Now!**

**Musician's Shop**

2 E. CENTER ST.

BALTIMORE 2, MD.

Everything in musical instruments-Free List.

Reasonable Prices

**PLASTIC HOMES**

New Building Material! Resurface old homes; build new ones. Colorful, beautiful! **LIQUID MARBLE**—Color-glazed! Molded, brushed, sprayed. **SANITARY COMPOSITION FLOORING**—Dustless, noiseless; put on like plaster; resilient—yielding as cork; lasts like stone; plain or marked in tile design. **RUBBERLASTIC Mold Compound**—Mold novelties, statuary, toys, gifts, plaques, plaster animals. **COLORED POTTERY**—Birdbaths, garden furniture, vases. **TILEX** colored roofing. Illustrated literature FREE.

**RAPID MARBLEIZING SERVICE, Dept. 12-B, Edwardsville, Ill.**

# POWER-CRAFT

Powerful 4 cycle gas engine, a dependable power plant for model planes, boats and many other applications. 1" bore and stroke, 250 to 4500 RPM. Complete prints for building this engine **$1.00.** Completed engine block tested and ready to run $45.00. Also complete prints for building a ⅝" bore and 11/16" stroke 2 cycle engine. **$1.00.**

**REN-WOOD ENG. SERVICE**

1138 N. Fremont St. So. Bend 16, Ind.

**WORLD'S LARGEST DENTAL PLATE MAKERS**

**FALSE TEETH** • by Mail

with **MONEY-BACK** Guarantee of Satisfaction

Made for you from your own mouth impres'n! on **60 DAYS' TRIAL**

**NEW LOW PRICES**

**SEND NO MONEY!**

**FREE** IMPRESSION Material, Catalog, etc. Act Today!

**UNITED STATES DENTAL CO.**

1555 MILWAUKEE AVE., DEPT. 5-42 CHICAGO, ILLINOIS


Copyrighted material

## WE WILL PAY

# $50.00 to $500.00

**each for original, practical, patentable**

## IDEAS FOR NEW TYPES OF FLOOR MATTING

which we consider worthy of manufacturing. Any kind of available materials may be employed.

If ideas are accepted, and not already patented, we will defray cost of procuring same on assignment to us.

A hand made sample, or workable drawing from which a sample could be produced, should accompany each idea submitted.

In submitting any idea it will be understood that no obligation on the part of American Mat Corporation will be assumed or incurred in the event the submitted idea is refused for any cause.

**AMERICAN MAT CORPORATION**

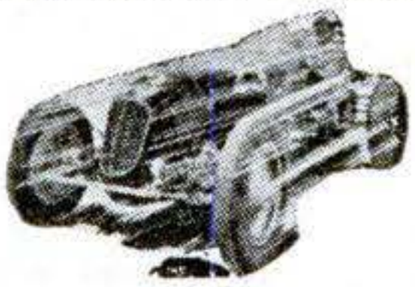
**2023 Adams Street** **Toledo 2, Ohio**

---

## *Floyd Clymer's* Popular MOTOR BOOKS

**Send for FREE Motor Book Catalog**

### INDIANAPOLIS "500" RACE HISTORY BOOK



Just out! **2000 illustrations;** 320 large pages; complete detailed data on **every** race held on Speedway since 1909. Foreign and U.S. cars and drivers shown. Enjoy for **10c a race** year after year history. Complete book **$3.50;** with De Luxe red Fabrikoid binding, **$5.00.** Postpaid.

### MOTOR RACING WITH MERCEDES-BENZ

Sensational book of Grand Prix Racing. 176 pages, includes 93 finest action photos. **Famous speedways, cars described.** See and read about Caracciola, Rosemeyer, Seaman, Ruesch, Mays, Nuvolari, Fagioli, Lang, others. Photos Mercedes-Benz, Auto-Union, Alfa-Romeo, Bugatti, Maserati, others. **Graphic, thrilling race incidents.** Postpaid **$2.00;** De Luxe clothbound **$3.00.**

**Ab Jenkins Race History Book, $1.50 . . . Power & Speed $2.50 . . . Speed**—How to Obtain It . . . **$1.50. All books postpaid.** See our ad under Autos, Classified section. Pin check or M.O. to this ad—mail now to

**CLYMER, Dept. B5, 2125 W. Pico, Los Angeles 6, Calif.**

---

# What Every Mason Wants

We have Important Masonic books for **Blue Lodge, Chapter, Commandery, Scottish Rite,** and **Shrine.**

**OUR RITUALS ARE USED THE WORLD OVER**

Send for **free** catalog of books and rituals for Masons, Odd Fellows, Knights of Pythias, Knights of Columbus, etc.

**EZRA A. COOK, Publisher, P. O. 796, RMY Chicago 90, Ill.**

---

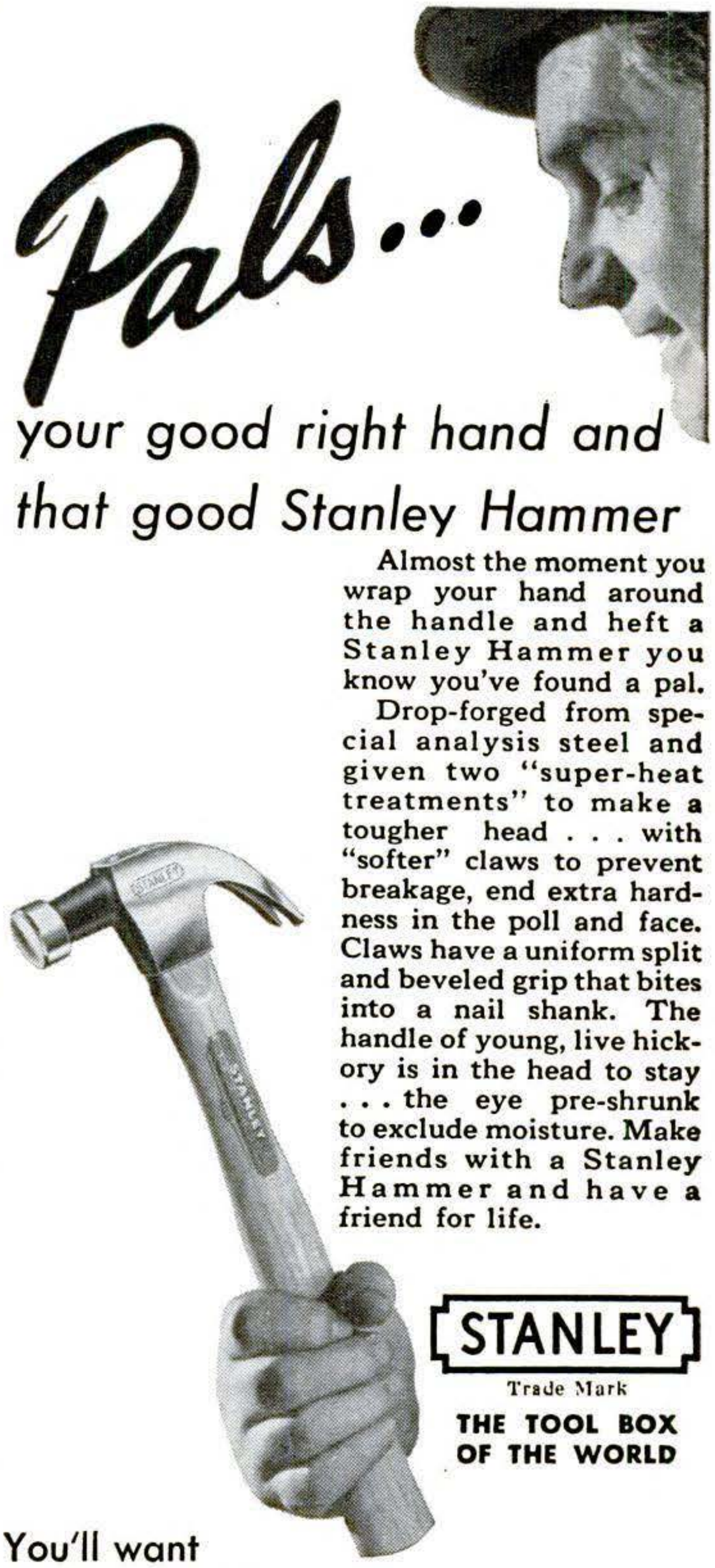
## *Collect U. S. Army Shoulder Patches*

**An interesting, fascinating hobby. From 20c to 50c each. Master set of 400 patches—$97.50. Assortments $1, $5, $10, $25, $50. Official patches available for every major Army and Air Corps Unit. Send $1 for sample selection of patches and PATCH CATALOGUE. Orders from Canada—add 20%.**

**SPRINGER'S**

**286 San Francisco Street**
**EL PASO, TEXAS**

---



# *Pals...*

## *your good right hand and that good Stanley Hammer*

Almost the moment you wrap your hand around the handle and heft a Stanley Hammer you know you've found a pal.

Drop-forged from special analysis steel and given two "super-heat treatments" to make a tougher head . . . with "softer" claws to prevent breakage, end extra hardness in the poll and face. Claws have a uniform split and beveled grip that bites into a nail shank. The handle of young, live hickory is in the head to stay . . . the eye pre-shrunk to exclude moisture. Make friends with a Stanley Hammer and have a friend for life.

**STANLEY**

Trade Mark

**THE TOOL BOX OF THE WORLD**

## You'll want these two books

The first book is free . . . "The Joy of Accomplishment", a brief introduction to tools and their uses. The second is the famous textbook, "How to Work with Tools and Wood", recently revised, fully illustrated. The cost is just $1.

**Stanley Tools, 256 Elm St., New Britain, Conn.**

Please send by return mail

☐ The FREE booklet. "The Joy of Accomplishment."

☐ 188-page book: "How to Work with Tools and Wood." $1.00 enclosed

(In Canada: Send order to Stanley Tool Co. of Canada, Ltd., Roxton Pond, Quebec.)

*Name* .....

*Address* .....

*City* ..... *State* .....

Copyrighted material

# PRESTO! ANYONE CAN MASTER GLAZE

Car Owners! Meet Master Glaze—the sensationally different luster for new and used cars! Not a wax—not an oil polish—not a paint!—nothing that "smears" over the surface.

**MASTER GLAZE** is a unique discovery—a creamy liquid—quick and easy to apply! Gives a hard, glass-like surface. Even gasoline cannot dull it! Lasts six months to a year! Amazing luster—beautiful, sparkling clean and brilliant! Doesn't finger-mark—doesn't smear! A match box full glazes an entire car. Seals the pores—protects! NOTHING LIKE IT!

**AGENTS**
An unusual opportunity! Quick, flashy demonstrator. Big profits. Good territory. Write today!

**FREE SAMPLE**
Just send your name and address today to

**MASTER GLAZE CO., 7720-548 W. Harwood Ave., Milwaukee, Wis.**

# Attention!

**CALLING ALL MODEL PLANE COLLECTORS and HOBBYISTS! NOW AVAILABLE!!**

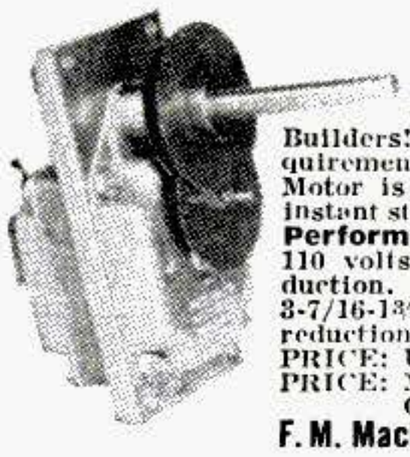
***The Only Collection of Its Kind In the World***

Distinctive miniatures are 100% molded plastic 1/72nd scale model airplanes, cast from the same dies that produced the OFFICIAL recognition models used by the GOVERNMENT in vital identification programs carried on throughout the WAR.

*B-26 MARAUDER—$4. Martin twin engine medium bomber typical of this low cost wonderful collection.*

It's a fact you cannot buy a put-to-gether solid model of near equal quality or preciseness at anywhere near the remarkable low cost of Superior Craft model.
Now is the time to get them while stock is on hand and collection complete. All models compactly packed and shipped plus postage anywhere. Send 25c in coin for illustrated brochure listing all models. The 25c will be deducted from your first order—WRITE NOW, right now!

**SUPERIOR CRAFT COMPANY** Dept. S-1, 60 E. 42 Street Suite 558, New York 7, N.Y.



# MODEL MOTORS

**AC: Shaded Pole Induction Type:** Model Builders! Here is a Midget Motor that will fill your requirements as a power source in your model building. Motor is equipped with magnetic clutch action to obtain instant stop of slow speed shaft and is reversible in rotation. **Performance and Specifications:** Voltages: 6-12-24 and 110 volts. 60 cycles AC., R.P.M., 3000 without gear reduction. 1-6-15-26 or 87 with gear reduction. Dimensions: 3-7/16-1¾-2 In., with gear reduction. 2-1⅝-1⅜ with gear reduction.
PRICE: Unit with gear reduction.....$9.75
PRICE: Motor without gear reduction.....$5.75
Other model motors available. Write to:

**F. M. Macken, Model Motor, 441 South Blvd., Oak Park, Illinois**

# 250 POWER TELESCOPE

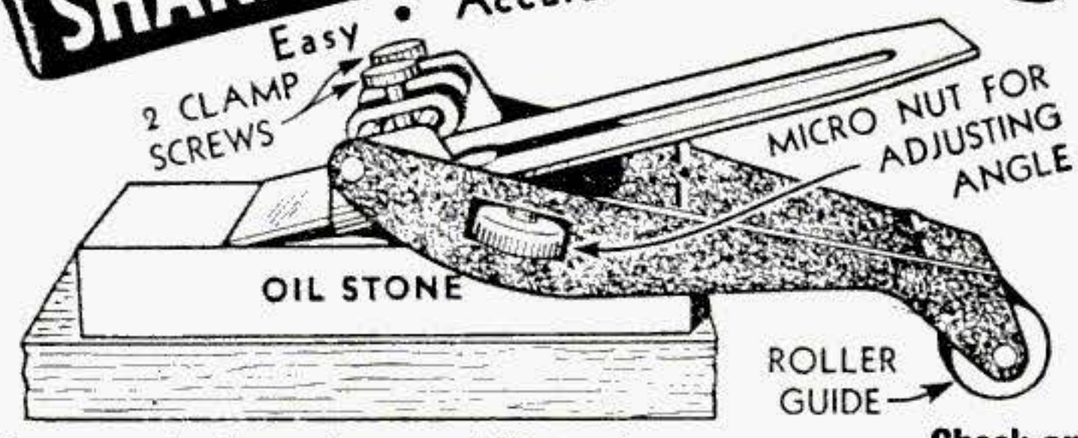
## COMPLETE LENS SET only $2.50

Here is your chance to own a real high powered telescope. See the mountains and craters on the moon, the ringed planet Saturn, the moons of Jupiter, distant ships, people, and hundreds of other interesting sights. Make your own high powered telescope in one evening of easy work. All optical parts for 6 ft. long refracting telescope completely finished. Set consists of 3 inch diameter 75 inch focal length ground and polished objective lens and all eyepiece lenses needed to give magnifications of 50X, 100X, 150X, 200X, and 250X as an astronomical telescope, and 50X, 100X, and 150X as a terrestrial telescope. Complete lens set with full directions for mounting, only **$2.50** postpaid.

**BROWNSCOPE, CO., Dept. 5P, 24 W. 45th St., N. Y. 19, N.Y.**

# SHARPER CUTTING EDGES

Easy • Accurate • Quick




It's easy to hone keen cutting edges on your chisels and plane blades. Precision adjustment for ANY ANGLE of bevel. Roller glide makes every stroke uniform across oil stone. Light, strong—ideal for home craftsmen, hobbyists, carpenters, cabinet makers.

**Check or money order $2.95 POST PAID**

**McLAREN INDUSTRIES, INC., Box 606, TROY, N. Y.**

# INVENTING —FOR PROFIT!

If you have an inventive turn of mind, write for free 28-page booklet explaining how the Institute of American Inventors is helping inventors pre-test the profit possibilities of proposed devices to fill today's unprecedented demand for *useful* new inventions.

**INSTITUTE of AMERICAN INVENTORS**
**Dept. 3, 1926 Eye St. NW, Washington 6, D. C.**

# PATENTS AND TRADE MARKS

## C. A. SNOW & CO.

*Registered Patent Attorneys Since 1875*
**Write for Free Book and "Certification of Invention" form**
**427 SNOW BUILDING, WASHINGTON 1, D. C.**

# INVENTORS WITH GOOD INVENTIONS

Should write us without delay for FREE BOOKLET. Protective Disclosure Form and facts about **The Inventor's Most Logical Markets.** Patented, Unpatented inventions, all kinds. Cash, Royalty, needed by specific manufacturers. If your invention is for sale, **write today** for full particulars. A Post-Card will do! Address:

**THE INVENTION REPORTER**
**4C-11106 South Longwood Drive** **Chicago 43, Illinois**

# PATENT YOUR IDEAS

**SEND FOR FREE BOOK** → HOW TO OBTAIN A PATENT

**Written by Former Member Examining Corps (1922-24) U.S. Patent Office.**

**CARL MILLER, Registered Patent Attorney**
**Former Member Examining Corps U. S. Patent Office**

**Woolworth Bldg., Dept. 56-C, New York — Bond Bldg., Dept. 56-C, Washington, D. C.**

# RADIO PARTS GRAB BAG!!

$25 value assortment of Coils, Condensers, Transformers, Resistors, Controls, etc. An experimenter's dream. Order today! Only..... **$3.98**

**MARKO SUPPLY, Dept. P.S. 5**
**2924 Logan Blvd.** **Chicago 47, Ill.**

# RAISE JUMBO BULL FROGS

**VERY PROFITABLE**

Female lays 10,000 to 20,000 eggs yearly. Price of breeders free, or send one dollar for a ten-page letter on how to raise Frogs, based upon my 20 years' experience.

**VOL BRASHEARS,** **BERRYVILLE, ARK.**

# a BETTER Triple-Action DRIPLESS OIL

PENETRATES
LUBRICATES
RUSTPROOFS

IN 4 OZ. "DROP" OR "STREAM" OILER 25¢

AMERICAN DRIPLESS OIL brings you a new high in top-quality Penetration . . . Lubrication ...Rust Prevention. Penetrates quickly — then converts to a long-wearing, rust-preventing film that "stays put". Functions perfectly from −20° F. to +200° F. Unrivalled for home workshop, sports kit, office . . . for finest mechanisms, bearings, tools, appliances, guns, etc. At Hardware, 5 & 10c, Sporting Goods Stores.

**AMERICAN GREASE STICK CO.**
**MUSKEGON, MICH.**

## MACHINE SHOP EQUIPMENT

Every man who owns a workshop should have a copy of this new, authentic catalog of Machine Shop Equipment . . . the latest tools made by the biggest manufacturers in the United States. Replete with illustrations, descriptions, prices. Prompt delivery on most tools listed in this catalog. Available at the cost of printing—50c a copy—Get yours today! **Price of Catalog Refunded on First Order over $5.00.** Send check or Money Order to

**CENTER TOOL CO.**
**152 Centre St., New York 13, N. Y.**

## CONFIDENTIAL LOAN SERVICE

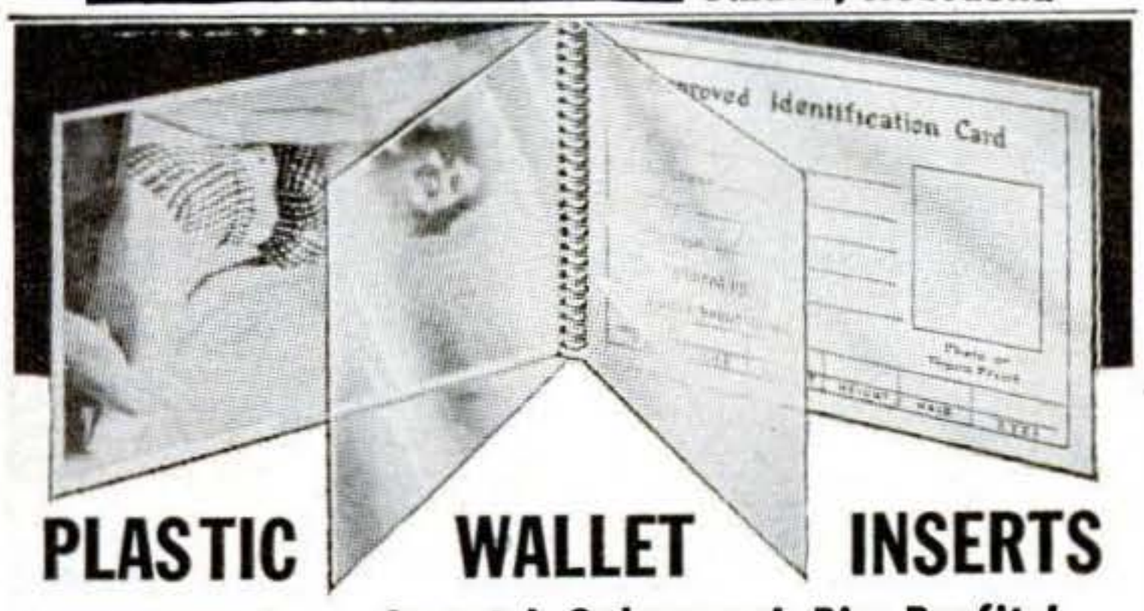
# Borrow $50 to $1000 BY MAIL

Need money? No matter where you live you can borrow **BY MAIL** $50.00 to $1,000.00 this easy quick *confidential* way.

**IT IS EASY TO BORROW BY MAIL!**
Completely confidential and private.
**Up to 18 months to repay.**

**NO ENDORSERS NEEDED**
EMPLOYED MEN and women of good character can solve their money problems quickly and in privacy with loans **MADE BY MAIL.** No endorsers or co-signers. We do not contact employers, friends or relatives. Up to 18 months to repay. Send us your name and address and we will mail application blank and complete details FREE in plain envelope. There is no obligation.

**FIRST LOAN CO.** World Herald Bldg., Dept. A-13 Omaha, Nebraska




## PLASTIC WALLET INSERTS

**IMMEDIATE DELIVERY!**
**$1.50**
**DOZEN ASSORTMENT**

***Agents! Salesmen! Big Profits!***
These dozen inserts sell easily for 50c to $1 each. You make at least $6 for yourself. Assortment has 4, 5, and 6 envelope books. Heavy plastic covers. Strong wire spiral binding. Identification card in each insert. FREE set-up display with first order. Excellent money-making sideline. Easy to carry. MONEY-BACK GUARANTEE on inserts you don't sell. Rush $1.50 for trial dozen. Big market waiting!
**EDMASTERS CO. Dept. PS5, 190 Berry St., Brooklyn, N.Y.**

# Movie Newsreels
HOLLYWOOD, CALIFORNIA.

# NEW HOME MOVIES

*'MODERN VENUS'*
**FRANCES VORNE**
**Star of**
**"SWIM SUIT REVUE"**

**NOW — MOVIE NEWSREELS** bring you interesting films for showings **in your home.** A variety of outstanding 8mm and 16mm reels are available: **"Swim Suit Revue," "Dance Comique," "World Champion Diving Stars," "Aquabelle," "Rhumba," "Hollywood After Dark," etc.** Any one or all of these movies will add to the enjoyment of your Home Movie Program. For your own pleasure . . . for the entertainment of your guests . . . **MOVIE NEWSREELS** are just the thing you've been waiting for!

## Ready Now!

## FRANCES VORNE IN "SWIM SUIT REVUE"

This beautiful introductory reel, available in 8mm or 16mm sound or silent, stars FRANCES VORNE the Modern Venus. Her pictures have appeared in LIFE, TIME, YANK and dozens of other magazines and newspapers.

In this gorgeous **MOVIE NEWSREEL,** Frances models ultra modern 1946 Swim Suits including the alluring DIAPER style and her own famous silk suit made from a captured parachute. Full lengths, close-ups and fashionable poses.

## MAIL COUPON

**MOVIE NEWSREELS, Dept. PS5.**
**P. O. Box 2631, Hollywood, Calif.**

☐ 8mm 50 Ft. $3.00 ☐ 16mm Sound
☐ 16mm 100 Ft. $5.00 100 Ft. $7.50
☐ I enclose $.....Full Payment.
or ☐ Send C.O.D., Plus Postage

Name.....
Address.....
City.....Zone.....State.....

☐ **SEND FREE CATALOG**


Copyrighted material

# Now A DYNAMIC HEAVY DUTY INDUSTRIAL WELDER

FOR ONLY **$23.50** COMPLETE...

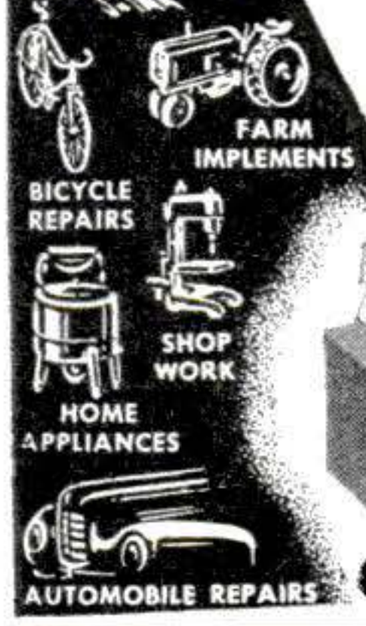
AVAILABLE NOW WITHOUT PRIORITIES!

WRITE TODAY FOR PARTICULARS

Get details on our 10 day trial offer

Member Chicago Association of Commerce

## IDEAL FOR AUTO - HOME APPLIANCE AND FARM REPAIRS




DESIGNED TO DO HIGH GRADE WELDING INEXPENSIVELY—Maintenance Men; Farmers; Mechanics; Machine Shops; Foundries; Auto, General Repair and Job Welding Shops; all using the DYNAMIC find it so indispensable and useful that they cannot afford to be without it. If inexperienced, you can easily learn to do a variety of high grade welding jobs by following the practical, simplified operating and welding instructions furnished. Once you see a DYNAMIC in operation, you won't want to be without it. Its simplicity will amaze you. In a year the DYNAMIC only costs you about 6c a day. Helmet, rods, cables, holder and operating instructions, etc., furnished.

## SAVES YOU VALUABLE TIME AND MONEY!

This portable DYNAMIC WELDER — easily carried to the job — can be operated from any convenient, properly wired 110 volt, 60 cycle line. Can also be supplied for 220 volt, 60 cycle operation and for other voltages and cycles at slight additional cost. Works on IRON, STEEL, BRASS, BRONZE, AND OTHER METALS—has 8 metallic and carbon arc welding heat stages—does work you would think only possible with larger more expensive machine.

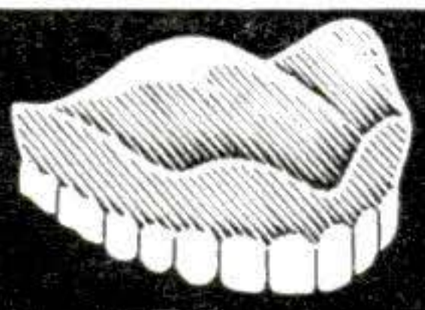
**DYNAMIC WELDER CO. • 13 East 23rd St.. GF Chicago 16, Ill.**

---

Say You Saw
It In Popular Science

---

# IF FALSE TEETH SLIP OR DROP



USE REFIT MAGIC **PLASTI-LINER**

MAKES ALL PLATES **FIT PERFECTLY PERMANENTLY** OR MONEY BACK

## ONE APPLICATION LASTS FOR LIFE OF PLATE

PLASTI-LINER is a professionally developed reliner for home use that ends forever the mess and bother of temporary applications that last for only a few hours or a few months. It is NOT a paste, nor a powder; but a strip of genuine dental plastic!

## SAFE AND EASY TO USE

PLASTI-LINER is non-toxic, pure, non-irritating, harmless, odorless, tasteless, smooth, molds to mouth. No heat necessary. Just 3 easy steps.

## "Excellent Results" *say users*

"I bought your product over a year ago. Have had no trouble with my plates since. I have told my friends and now all of us with false teeth use PLASTI-LINER. It really works." Mrs. E. S., Brooklyn, N. Y.

**FREE!** Our competent staff dentist will answer all your plate problems.

**SEND NO MONEY — ORDER TODAY**

PLASTI-LINER CO., Dept. 69
Walbridge Bldg., 43 Court St., Buffalo 2, N. Y.

Rush PLASTI-LINER with complete directions. I will pay Postman $..... plus postage charges. I may return package for refund if I am not satisfied.

☐ **$1 for** UPPER or LOWER ☐ **$2** for Both

Name.....

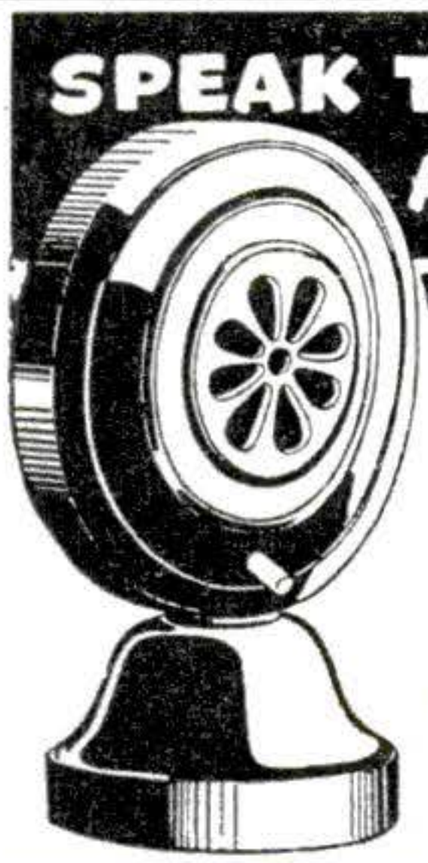
Address.....

City.....Zone.....State.....

You Save Postage by Enclosing Money

---

# SPEAK THROUGH ANY RADIO WITH *Mike Jr.*



Broadcast your personal message, birthday greetings, etc., from another room. Fun at parties. Tell the kiddies stories, etc. Easy to connect. Full instructions included.

**$1.00** Postpaid

Dealer Inquiries Invited

**UTILITY STORES, 117 So. Wabash Ave.**
Dept. EE - 16 Chicago 3, Illinois

---

# *What a Toy - what a GIFT!*

for ONLY $1
MICKEY MOUSE VIEWER
and No. 1 Film Strip

**GIFT SET $3.95**
**MICKEY MOUSE VIEWER and 13 Film Strips**

FILM STRIP FEATURES:
1. BRAVE LITTLE TAILOR
2. THREE LITTLE PIGS
3. THE PRACTICAL PIG
4. CHICKEN LITTLE
5. TORTOISE AND HARE
6. THE UGLY DUCKLING
7. GRASSHOPPER AND ANTS
8. THE PIED PIPER
9. THE GOLDEN TOUCH
10. LITTLE HIAWATHA
11. THE POINTER
12. DONALD'S VACATION
13. GOOD TIME FOR A DIME

MICKEY MOUSE VIEWER and thrilling, laugh-a-second full-color film strips — condensed versions of famous WALT DISNEY features. These are actual scenes from WALT DISNEY films.

☐ Please send me GIFT PACKAGE for only $3.95.
☐ Please send me MICKEY MOUSE VIEWER and No. 1 film strip for only $1.00.
☐ Please send me Individual Film Strips checked by number for only 25c each.

Remittance enclosed for $.....

INDIVIDUAL FILM STRIPS PRICE 25c EA.

SEE YOUR DEALER FIRST

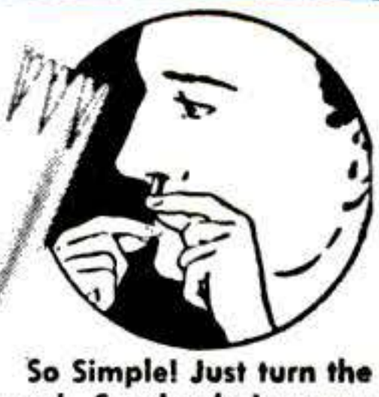
**CRAFTSMEN'S GUILD**
Dept. PS-5, 6916 Romaine St., Hollywood 38, Calif.

---

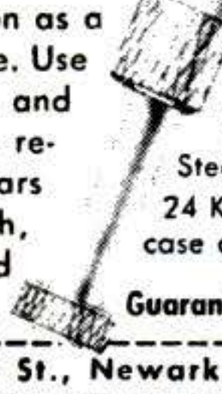
# DON'T PULL HAIR FROM NOSE

*May Cause Fatal Infection*

Use the Hollis **KLIPETTE** New Invention
REG. U.S. PAT. OFF



You can cause serious infection as a result of pulling hair from nose. Use of scissors is also dangerous and impractical. No better way to remove hair from nose and ears than with KLIPETTE. Smooth, gentle, safe, efficient. Rounded points can't cut or prick skin.



So Simple! Just turn the end. Surplus hair comes out easily, gently.

**$1** Made from fine Surgical Steel, Chromium plated—also in 24 Kt. Gold Plate in smart leather case at $3.50 (plus 70c Fed. Tax)

**Guaranteed to Satisfy or Money Back**

**HOLLIS CO. • 11 Commerce St., Newark 2, N. J. • Dept. K-87**

Enclosed is $.....for.....KLIPETTE(S) at $1 (no tax); .....in gold plate at $3.50 (plus 70c Federal Tax). If I am not entirely satisfied, I may return the above for refund.

Name.....Address.....

Copyrighted material

# WAR SURPLUS BARGAINS

★ ★ ★ ★ ★

## SENSATIONAL VALUES FOR QUICK LIQUIDATION

### BOMB PARACHUTES

Of fine white nylon fabric 5 x 8 feet in diameter with split seam for directional dropping. Designed for dropping fragmentation bombs, emergency rations, etc. Each packed in a metal container. Weight 6 lbs.
**No. R-162** Each only . . **$1.95**

### AIR CORPS PLASTIC FLASK SETS

Two handy, transparent plastic flasks with canvas case. Used by the U. S. Air Corps. Holds any kind of liquid. Each flask measures 4¼x6¼ inches. Has clamp-on top plus screw cap. Fine for use on camping trips, picnics, etc. Weight 1 lb.
**No. R-179**—Set only **$1.49**

### POPULAR RECORD ASSORTMENT

This assortment of 50 records includes current dance, race, blues and hillbilly selections. These records have been used in juke boxes—but all are guaranteed perfect and playable. No two alike. Many famous name bands and artists included. Shipped express collect only—no exchanges, trades or refunds at this low price.
Wgt. 28 lbs.
**No. A-303**—50 records . . . . . **$9.04**

### NEW SATCHEL POUCHES

Brand new shoulder type duffle bag pouches, ideal for luggage, school books, lunches, etc. Measures 11 x 12 inches. Of heavy canvas duck with taped edges. Weight 2 lbs.

**No. X-113** Each **$1.69**

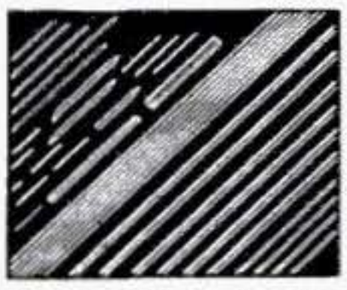
### DIRECTIONAL COMPASS

For all outdoorsmen, boy scouts, etc. Liquid type, free acting and accurate. Gives direct reading. Tells you immediately what direction you are traveling. Plastic body measures 3⅛ x 1⅛ inches. Has waterproof compartment for matches.
**No. R-208** Each only **$1.49**

### BOOBY TRAP FIRING PIN

Consists of trigger and trip arrangement with cord for remote firing control. Has powerful spring action. Ejects a pencil 8 to 10 feet. Has many uses such as burglar alarms, etc. Brand new!
**No. R-178** Each . . . . . **49c**

### DECORATIVE CHROME STRIPS



For your car, boat, furniture, etc. Highly polished chrome finished strips with clinched edges for flush mounting to any surface. The 3 pound kit provides approx. 43 pieces in lengths from 4 inches to 3 feet and ¼ to ¾ inches wide.
Wgt. 4 lbs.
**No. R-224**—3 lb. Assort. only **$2.00**

### MESS KITS

Regulation Army Mess Kits. Ideal for campers, boy scouts, etc. Slightly used but guaranteed perfect. Two pieces. Folding handle.

**A-116**—
Each . . . . . **69c**

### GI POCKET BELTS

Of heavy canvas. Adjustable waist size. Each with 5 pockets and metal recoil fitting. Brand new. Fine for hunters, boy scouts, etc. Wgt. 3 lbs. **A107** **98c**

### 7-LB. EXPERIMENTERS PARTS ASSORT.

A "gold mine" for the radio serviceman. Hundreds of valuable radio parts, new radar and electronic parts and subassemblies, coils, resistors, screw machine parts, etc.—worth many times this low price.
**A130R**—7 LBS.
**$1.79**

### CANTEENS, CUPS & COVERS

Regular U. S. Gov't issue canteens. Plastic screw top cap chained to body. Slightly used.

**A117**—METAL BODY. Each . . . **69c**
**A118**—PLASTIC BODY. Each . . . . . **69c**
**A109**—Canteen Covers. New. Each . . . . . **69c**
**A119**—Canteen Covers. Used. Each . . . . . **35c**
**A120**—Canteen Cups. Used. Each . . . . . **25c**

### MICROPHONE BUTTON

Brand new! For experiments in radio, electronics and other electrical apparatus. Used in telephone, amplifier and detectaphone work. Diameter 2½ inches. New.
**A512**—EACH . . . . . **98c**

### AMMUNITION BOX

Fine for storing valuables, carrying lunches, etc. Of heavy gauge 7½x11x4 inches. Fireproof. Hinged lid with folding handle. Olive drab finish. Used, but perfect. Shipping wt. 4 lbs.

**A525**—
EACH . . . . . **25c**

### PLASTICS—LUCITE AND PLEXIGLAS

In sheet form. Good workable sizes. Transparent. For costume jewelry, etc. Easy to work and polish. Shp. wgt. 6 lbs.
**A280**—5 LB. ASST. . . . . **$4.75**

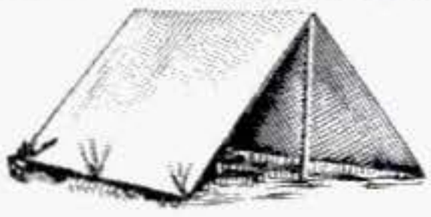
### CATALAN—ASST. COLORS

Extruded shapes, rounds, half rounds, etc. Easy to machine. Furnished in assorted colors, shapes and lengths. Shp. wgt. 6 lbs.
**A281**—5 LV. ASST. . . . . **$4.75**

### U.S. Govt. BOLO KNIFE

Extra heavy. For farm, home or jungle use. Blade of Gov't. formula cutlery steel. Walnut riveted handle. 3½ inch hilt. 10½ inch blade. You'll find hundreds of uses for a Bolo knife. Blade will take and hold a keen cutting edge. Wt. 2 lbs.
**A112**—with Army Sheath . . . . . **$4.95**
**A212**—Leather Sheath, extra . . . . . **$1.50**

### PUP TENTS



Regulation Army Pup Tents of durable, brown canvas. Used, but in good condition Fine for campers, outdoorsmen, boy scouts, etc. Grand Xmas gift for children.
Wgt. 8 lbs.
**A1**—Tent Only . **$3.95**
**A110**—Tent, new . . **$7.95**
**A101**—Ropes, wooden poles and stakes for above. Per set . . . . . **$1.00**

### BIG SHIPS BELLS

Purchased from U. S. Maritime Comm. Measures 10 inches high. 9¾ inch flare. Big 6 inch clapper. Weight 15 lbs. Fine for farms, clubs, estates, etc. All new. Ship. wt. 10 lbs.
**A541**—
ONLY . . . . . **$9.85**

### PROF. TELEGRAPH KEY

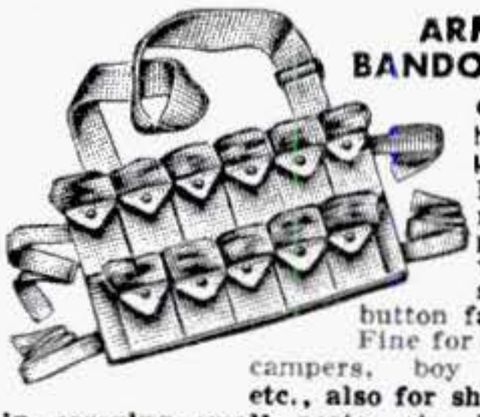
Purchased from the gov't. Finest design and construction. Base measures 3x4¾ inches. Original value $2.50. All parts of instrument brass. Adjustable.

**A147**—
Each . . . . . **98c**

### MEDICAL STERILIZER

Consists of alcohol burner and sterilizing tray in hinged metal case 1⅞ x 1⅛ x 2⅝ inches. Burner may be used separately. Bright nickel finish. All brand new.
**A125**—Each . . . . . **98c**

### ARMY BANDOLEERS



Of fine heavy khaki. Big roomy pockets with snap button fasteners. Fine for hunters, campers, boy scouts, etc., also for shop work in carrying small parts, etc. Material alone is worth this price. Shp. wt. 1 lb.

11 Pocket Type No. 129 EACH **49c** | 5 Pocket Type No. 110 EACH **29c**

### ORDER DIRECT FROM THIS AD

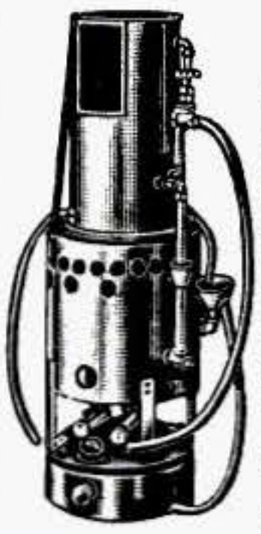
Values galore! Hundreds of hard-to-find items for home, shop and outdoors. Make remittances by money-order, bank draft or personal check. Send 25% deposit on C.O.D. orders. No C.O.D.'s on orders for less than $5.00. Include sufficient postage on parcel-post orders—any overage will be promptly refunded. All quotations F.O.B. Chicago. Used items and materials are guaranteed serviceable and as described. Your money back if not more than satisfied.

**BIG ILLUSTRATED CATALOG FREE**

# STARK'S

Dept. PS546
509 So. State St.
CHICAGO 5, ILL.

### STILLS



Distill your own water with one of these fine portable stills. Purchased from the Gov't. Completely self contained. Has 1 gallon capacity; output 1½ gal. per hour. Fitted with genuine Coleman double burner stove. Operates 5 to 7 hrs. on one filling. Heat output 20,000 BTU's. Stove alone is worth this price. All new and guaranteed. Instr. included. Weight 109 lbs.
**No. 206** Each . . . **$59.50**

TO: Reader
FROM: Editor

# PACKAGING the pieces . . .

PUBLISHER Godfrey Hammond likes to define editing as "the big dream plus infinite patience with the little pieces." Certainly any publication, whether crossroads weekly or million-copy magazine, has to have a big idea. And it has to express that idea with a mosaic of small pieces: the uncounted combinations of the alphabet; the pieces of type; the thousands of dots of metal that transfer a photograph to the printed page; the even tinier dots of ink that make color printing possible.

The big dream, for *Popular Science Monthly*, began 74 years ago. It was the vision of a blind man named Edward Livingston Youmans. He saw science, then, as something that affected people who might not understand scientific jargon but who should know what it meant. He enlisted such hallowed scientific workers as Herbert Spencer and Thomas Huxley to popularize science.

**Godfrey Hammond comes of a long line of sea captains. Following service in World War I, he worked for Munsey, the *New York Tribune*, and on *Popular Science Monthly* for a time. He then became publisher of *Christian Herald*, but returned to Popular Science Publishing Company nine years ago, and for the past seven years has been President. Father of five children, he gets small credit as a patriarch since there were two sets of boy twins —brought up on Popular Science.**

Today, science hits the headlines of the newspapers, is featured in the biggest magazines, crops up in every conversation. And because science is popular, Popular Science is bigger. But PSM's big idea is still to convey the *meaning* of science to those who refuse to be confused by the *words* of science.

Science hasn't made editing any easier, however. It has mechanized Gutenberg and Daguerre. But until a writer can think into some kind of scope and have the words spray automatically onto the paper we writers, artists, editors, engravers, paper makers and pressmen will have to continue chopping ideas into little pieces and then wrapping them in the covers of your magazine.

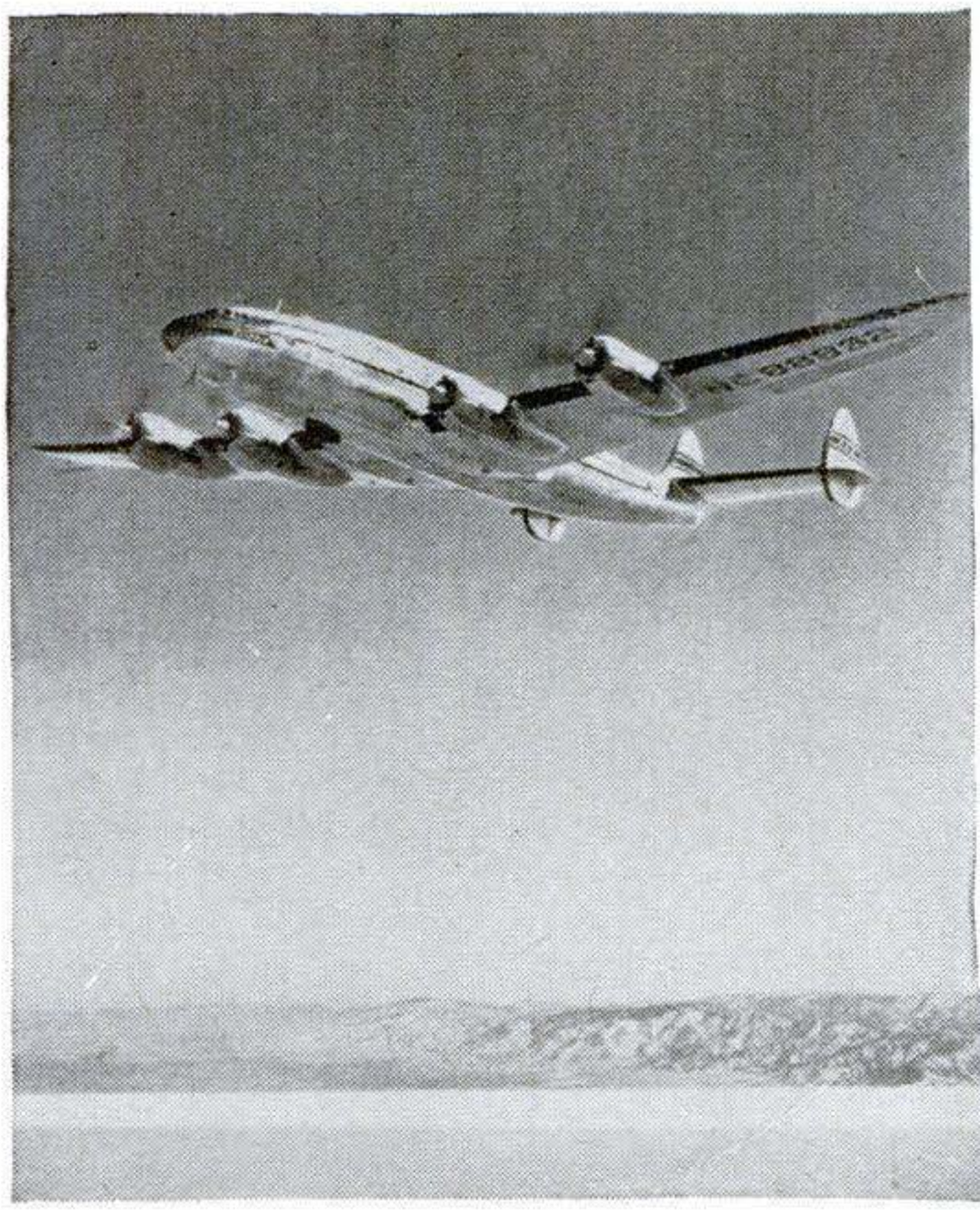
Take Leon Shloss, whose by-line you have seen on several important PSM stories recently. In this issue you can hardly see his name except on the masthead. But Shloss is invisibly written on a lot of stories, which he carpentered and polished into more interesting and enjoyable shape for you.

**Leon Shloss, a basketball addict, has played over a thousand games, won honorable mention in the 1928 All-America when he was at The American University. He taught history and coached basketball at Penn State, worked in Washington for International News Service. He left INS as aviation editor to start public relations machinery for the aircraft industry. Then the Navy called him to get press work going for naval aviation. He traveled some 200,000 miles by plane and warship showing the American press the war.**

Or take Wes Griswold, whose name has not yet appeared at the head of an important story in PSM only because he has been too busy as head of the copy room. Griswold's is the thankless job of coordinating the flow of all the many pieces into the three-quarters of a pound of science and mechanics on paper that the postman crams into your mailbox or you lift from the newsstand. Griswold's is the responsibility of seeing that the biggest ideas fit the inexorable limits of type, and that your name is spelled right if we print your letter to the editor.

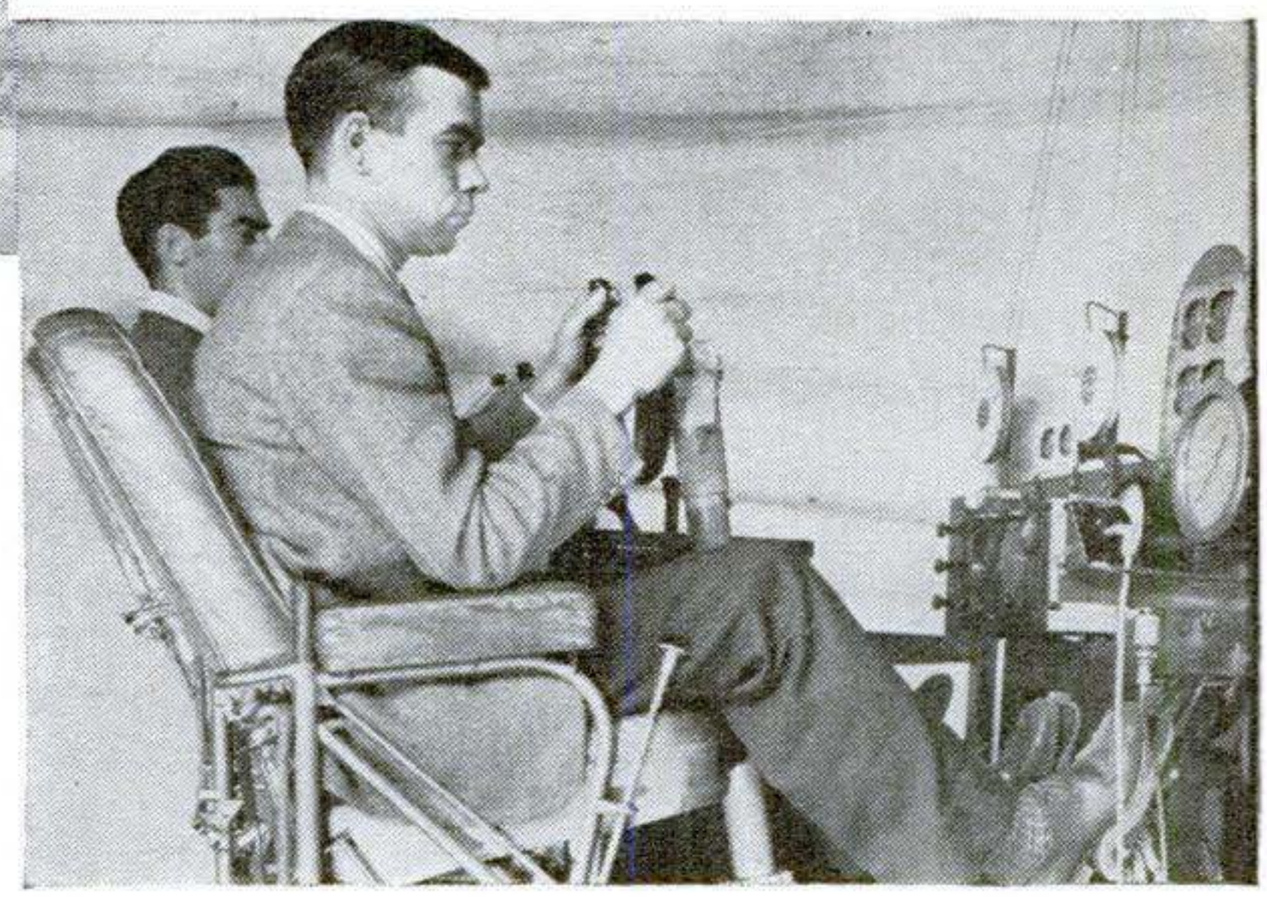
**Wesley S. Griswold was a reporter, feature writer, and Sunday magazine editor on the venerable and respected *Hartford Courant* for 11 years before he went with Travelers Insurance Co. in public relations. In the Army in '42, he went through OCS, was soon writing and editing technical manuals for the AAF, eventually became a captain. By extracting the facts from two expert pilots, he wrote the training manual for the P-61, but never got a chance to ride in one.**

Copyrighted material

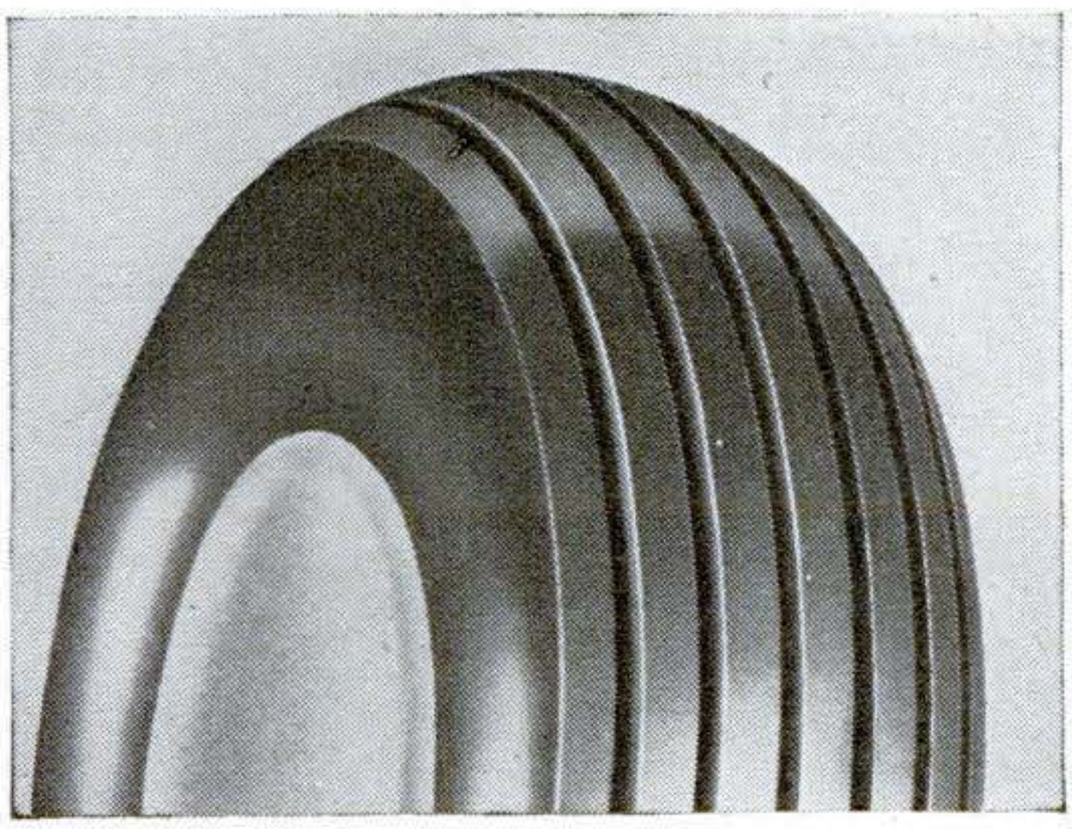


# "CONNIE"

## A QUEEN OF THE AIRWAYS



**THE LOCKHEED CONSTELLATION** went through months of pre-flight testing. Under the severest simulated conditions . . . using vibrating equipment, wind tunnels, temperature chambers, control boards, etc., "Connie" showed her royal blood before she ever left the ground. Three years with the Army Air Transport Command proved this great ship's ability to set new standards of dependable performance and economical operation.



**U.S. ROYAL AIRPLANE TIRES** are tested, too... in the laboratory and in actual use on every kind of landing strip. Wherever airplanes fly, there is a lighter, stronger, U.S. Royal Airplane Tire of superior design to cushion every landing and take-off. And "U.S.," whose pioneering of rayon and nylon cord bodies was the beginning of the truly modern airplane tire, is geared to provide royal service to commercial air transport everywhere.

U.S. TIRES

***SERVING AMERICAN AVIATION THROUGH SCIENCE***

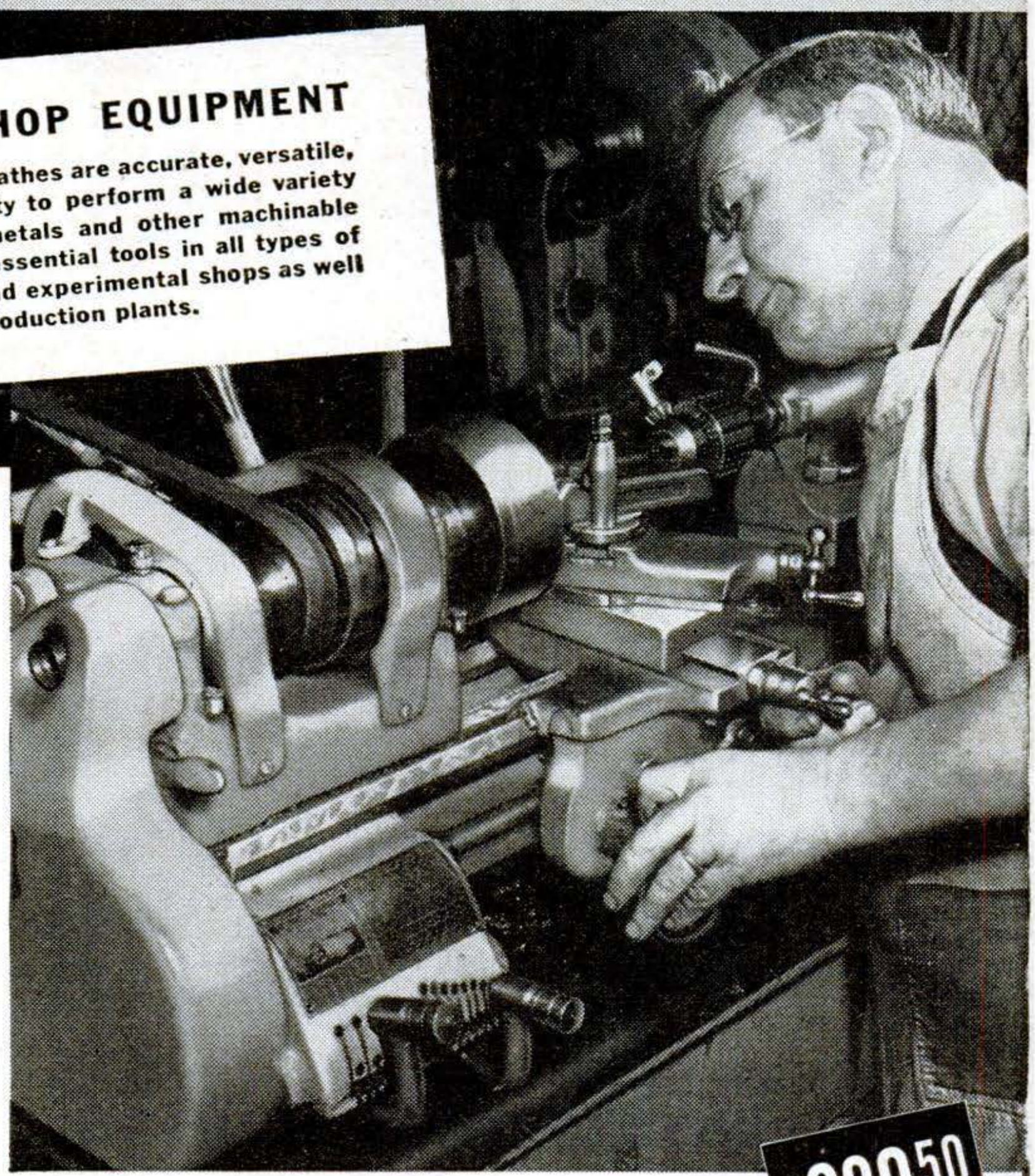
**UNITED STATES RUBBER COMPANY**

**6600 EAST JEFFERSON AVE., DETROIT 32, MICHIGAN**
**5675 EAST ANAHEIM TELEGRAPH RD., LOS ANGELES 22, CALIF.**



Copyrighted material

# SOUTH BEND LATHES



## ESSENTIAL SHOP EQUIPMENT

**South Bend Precision Lathes are accurate, versatile, dependable. Their ability to perform a wide variety of operations on all metals and other machinable materials make them essential tools in all types of maintenance, repair, and experimental shops as well as in toolrooms and production plants.**

## 9-INCH LATHE FEATURES

**Fine workmanship by highly experienced machine tool craftsmen.**

**Superfinished spindle with large bearings.**

**Belt drive for smooth, quiet operation at high speeds.**

**Back-gear drive for power and low speeds.**

**6, 8, 12 or 16 spindle speeds.**

**Thread cutting range (Model A)—4 to 224 per inch, 48 pitches.**

**Precision lead screw for thread cutting.**

**Worm drive and friction clutch for power longitudinal and cross feeds (Models A and B).**

**Three hand-scraped V-ways and a flat way on bed to insure perfect alignment of headstock, saddle and tailstock.**

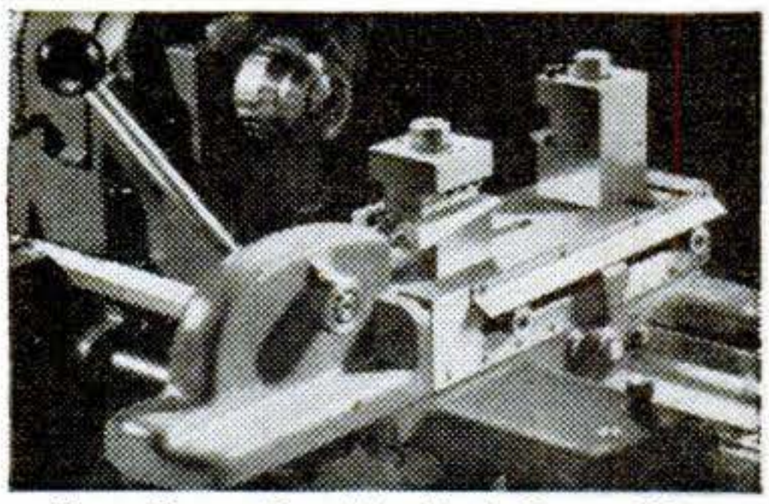
**9" x 3' South Bend Model A Precision Bench Lathe with 12-Speed Drive, less electrical equipment and bench,**

**$239.50 F.O.B. FACTORY**

South Bend 9-inch Precision Bench Lathes are widely used, both in small shops and in large factories. They perform difficult precision jobs easily and with unfailing accuracy on all types of materials from tool steels to new light metals and plastics. They are fast, easy and economical to operate. Dependable service and long life are designed and built into them. South Bend Lathe prices are moderate and operating costs definitely are low. If you plan to equip a shop soon, or to increase or replace your present equipment, write today for a catalog and the name of your nearest South Bend Lathe distributor.

***Write for Catalog***

**South Bend Precision Lathes are made with 9", 10", 13", 14-1/2", and 16" swings. State size lathe in which interested when writing for catalog.**



**Handlever Double Tool Cross Slide**

This attachment permits a three tool set-up which speeds successive operations in production work. The complete line of South Bend Attachments and Accessories are shown in Catalog 77. Write for it.

LATHE BUILDERS SINCE 1906

**SOUTH BEND LATHE WORKS**

456 E. MADISON STREET • SOUTH BEND 22, INDIANA



Copyrighted material

# The Light that Never Fails!

***"Emergency Case!"***

***While the city sleeps, lights blaze in a hospital ward —they mean "Doctors at Work!"***

He isn't interested in making speeches and taking bows on the magnificent job he does. He's just interested in doing that job with all the skill and devotion he possesses.

His work is never done. His battle knows no lulls. But he asks no quarter. All this he knew when those proud letters "M.D." were first affixed to his name.

R. J. Reynolds Tobacco Co., Winston-Salem, N. C.

*According to a recent Nationwide survey:*

# *More Doctors smoke Camels than any other cigarette!*

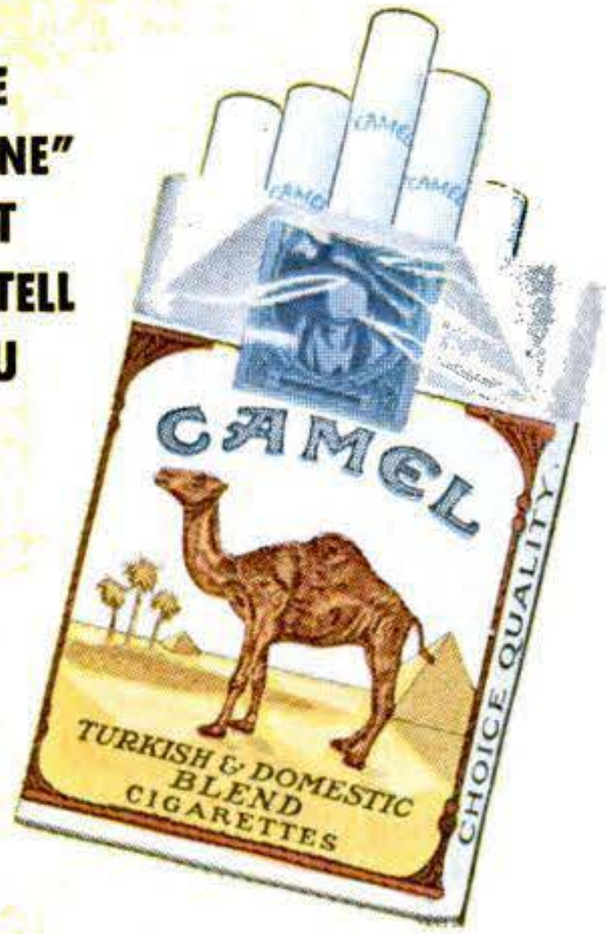
● "WHAT CIGARETTE DO YOU SMOKE, DOCTOR?"

Three independent research organizations recently put that question to 113,597 doctors. Family physicians, nose and throat specialists . . . doctors in every branch of medicine were asked. More doctors named Camel as their smoke than any other cigarette.

Like the rest of us, doctors smoke for pleasure too. Camel's full, rich flavor appeals to their taste . . . Camel's cool mildness registers with their throats . . . just as with millions of other Camel smokers' the world over.

**THE "T-ZONE" TEST WILL TELL YOU**

The "T-Zone"—T for taste and T for throat—is the proving ground for any cigarette. For only your taste and throat can decide which cigarette tastes best to you . . . how it affects your throat.




**CAMELS** *Costlier Tobaccos*

Copyrighted material

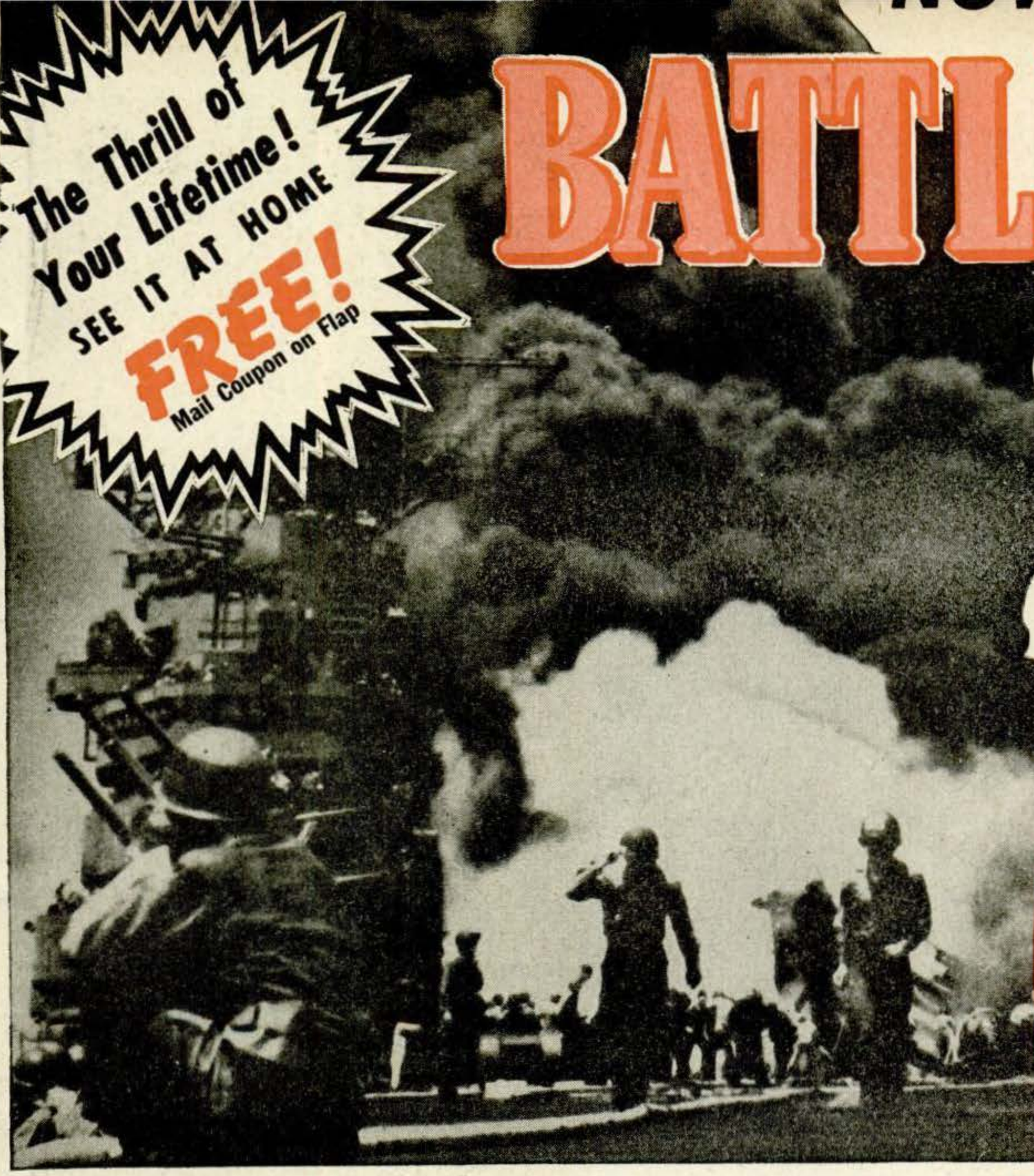
The Thrill of Your Lifetime! SEE IT AT HOME FREE! Mail Coupon on Flap

# BATTLE ST

## —Your

## EVERY GREA

**Told by the**
**From Norfolk**



**and illustrated wi**

**Over 50**

**MAGNIFICEN PHOTOGRAP**

***—many full color— the confidential f of the Navy***

***NOW THEY CAN BE TOLD: Behind the Scenes Dramas of Our Navy!***
***NOW YOU CAN SEE THEM: Hitherto Secret Photos Never Before Released!***

"BATTLE STATIONS!" The ship's loud speaker sounds the alarm! It's "Mae Wests" for all hands! Then all Hell is loose! Orange flames from crashing Zeros! Pin-pointed bombings! Terrific salvos! Flaming, smoking beachheads! . . . Death . . . agony . . . glory . . . break over our men as the world's mightiest fleet goes into action!

*Now hear this!* Turn to for this big new book—for the first uncensored story of our modern Navy . . . Complete in one volume . . . Told by the great admirals . . . Pictured in hundreds of startling, never-before-published action photos, maps, documents (many in full color) right from the Navy's confidential files!

Astounding photos after photos reveal glorious epics of our Seabees, Marines, Coast Guard, the Fleet, the Air Arm, Amphibious Forces and the Armed Guard! Thrill to this authentic photo-drama of your Navy's cruise in VICTORY, actually written by the men who charted that cruise! Feel a new pride in every branch of our Navy. . . .

### See How America's First Line of Defense Swings Into Action Throughout the Globe!

SEE the outbreak of war in September 1939, when the Navy convoyed American cargo ships; through the American invasions of the African, Mediterranean and Channel Coasts; through the battles in the Pacific!

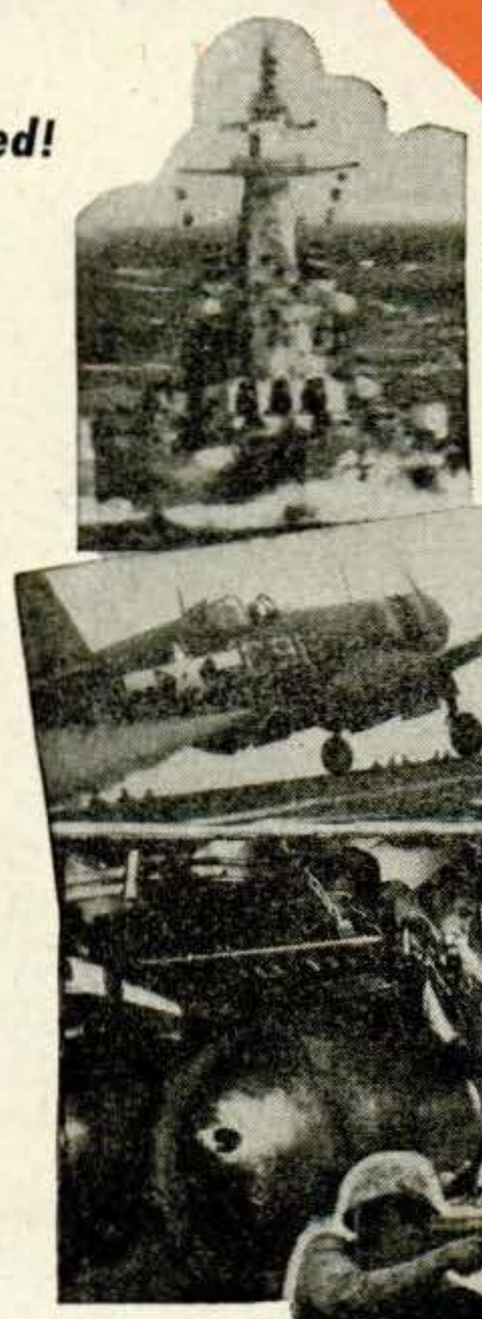
Learn from none other than Admiral of the Fleet Ernest J. King, Chief of Naval Operations, the secrets of the Navy's strategy that won for America such amazing triumphs. See Navy guns knocking hundreds of Jap Zeros from the sky . . . See mad Kamikazes crashing the flight decks of Carrier Bunker Hill . . . See the Navy ferrying our armies to invasion shores, even across the Rhine! . . . See Halsey's Third Fleet blasting the prize Jap battleship Yamato!

Page after page, many in full color, bring to life, with the breathless continuity of an action film, many epical achievements . . . the huge Naval Bases erected on Bermuda, Newfoundland, Trinidad, Nova Scotia and many other far-flung areas for the protection of our homeland . . . the campaign which wiped out the U-boat packs that all but halted our shipping . . . the strategy against V-1 and V-2 bombs marked for American cities . . . the Navy's powerful Squadron 58 in full battle-action in the Philippine Seas . . . the signing of the Jap surrender on the USS Missouri—shown in full color! More than 500 pictures in all, mostly full page! Action maps of all campaigns!

Here is the true and dramatic account of our Navy, not only in war, but in the important role of preserving the world's peace!

### See the Sensational Exploits of Navy Fliers, Submarine Heroes, Amphibious Troops!

Now for the first time, officers commanding undersea operations reveal the hidden mysteries behind our Silent Service. You also see the glorious but little known achievements of the Seabees, the Marines, the Coast Guard, the Fleet, the Air Arm, Waves, Spars, "Lady Marines," Amphibious Forces, etc. You will be amazed to learn of our Navy's achievements in Bacteriological Research, Radar, Medical Discoveries, Armament, new Radio Controlled Flying Bombs, etc. **(Continued on other side of attached flap.)**



**Actual Size 7" x 10"**

**1st Captured Jap Photos of Our Navy**

Copyright 1946 by Wm. H. Wise & Co., Inc.